2019 UTILITY PROGRAM REVIEW

OVERVIEW

The Mat-Su Borough School District manages utility usage through various energy conservation efforts, such as automated systems to turn systems and devices on/off. As enrollment increases, square footage is added to the District, and facility use events become more prevalent, the District has noted a trend of increased utility usage and spend.

This document provides an overview of MSBSD's utility management program. Utilities include:

- **Electricity**
- **Natural Gas**
- **Fuel Oil**
- **Water & Sewer**
- **Communications**
- **Refuse & Recycling**

For each utility type, information is provided that includes an overview (with a cost/usage analysis) and information about continual improvements. Actual dollar amounts and usage rates in this document are from the 2017-2018 school year (FY18).

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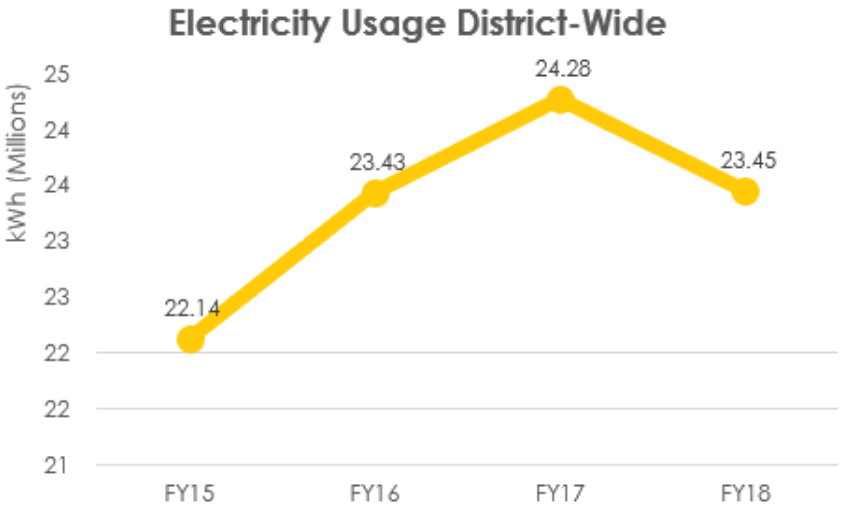
MATANUSKA-SUSITNA
BOROUGH SCHOOL DISTRICT

ELECTRICITY

Overview

Electricity is the largest cost-driver and has the highest usage rates of all utilities District-wide. In FY18, MSBSD used **23,447,378 kWh**, a decrease of nearly one million kWh from the prior fiscal year. Electricity accounts for about 75% of energy costs. In FY18, MSBSD spent **$4,121,772** on electricity.



Several factors influence electricity usage, including:

- *Increased square footage*: Over the last four years, MSBSD added approximately 338,000 square feet in the form of five new schools, a large-scale addition to an existing school, and 16 portables.
- *Facility use*: Weekend facility use events increase electricity usage on days when lights and other systems would have otherwise been turned off.
- *School and system types*: Some school buildings and features are less energy-efficient than others due in part to their design and age. Inefficient systems require more resources to keep them running.

Improvements

Because of electricity's large-scale use and cost, MSBSD has committed many resources to ensuring continuous improvements. Recent improvements include:

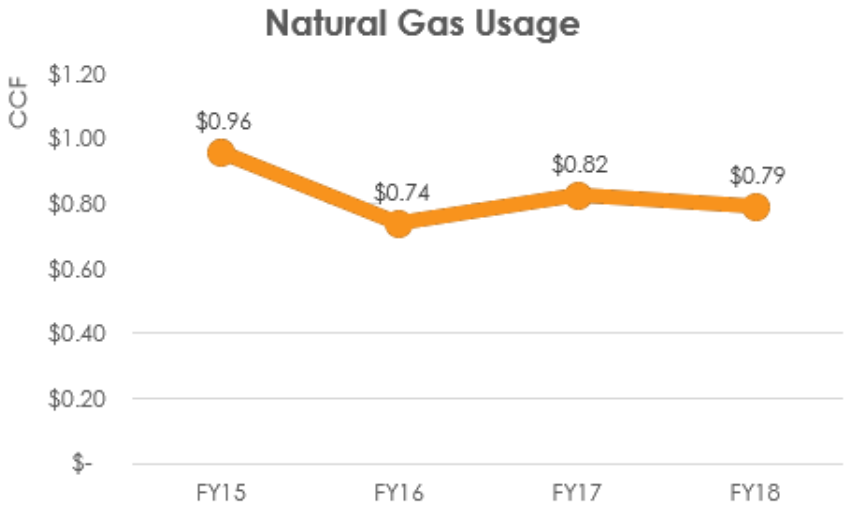
- *BMON (Building Monitoring) dashboards*: Developed in partnership with the Alaska Housing Finance Corporation (AHFC), MSBSD can see near real-time data about electricity and other utility usage by building. BMON highlights electricity usage per SF, hourly usage diagrams, and current sensor values for specific rooms, boilers, and air handlers so that staff can quickly identify anomalies and address any situations that arise.
- *Scheduling and set points:* By scheduling equipment to run only during occupied times and having set points that maintain comfort, the District is able to reduce energy usage, extend equipment life spans, reduce maintenance requirements and identify facility problem areas.
- *Energy efficiencies analysis*: By evaluating the energy usage per square foot for all facilities, the District is able to identify which construction type and building style is the most efficient.
- *LED lighting upgrades*: Converting to LED lighting is an ongoing project in the District. Beginning in 2013, the Facilities Department has been migrating high-energy usage areas and replacing small areas as time and budgets allow. High schools can save over $7,300 per school year by having LED lights in the gymnasium and middle schools can save over $5,800 per school year. Despite the initial cost to transition to LED bulbs from incandescent bulbs, the cost savings over the life of the bulb is significant: The average LED bulb provides 50,000 hours of use. Additionally, lighting upgrades reduce the maintenance man power requirements for lighting replacement and repairs by up to 90%.

NATURAL GAS

Overview

Natural gas is the second largest cost-driver of all utilities District-wide. Natural gas usage is measured in CCF, or the volume of gas in 100 cubic feet. In FY18, MSBSD used **1,377,395 CCF** of Natural gas. The total cost in FY18 was **$1,442,778**, or one-quarter of energy costs.

Natural gas unit costs remain relatively stable, averaging to about $0.83 per CCF.



Improvements

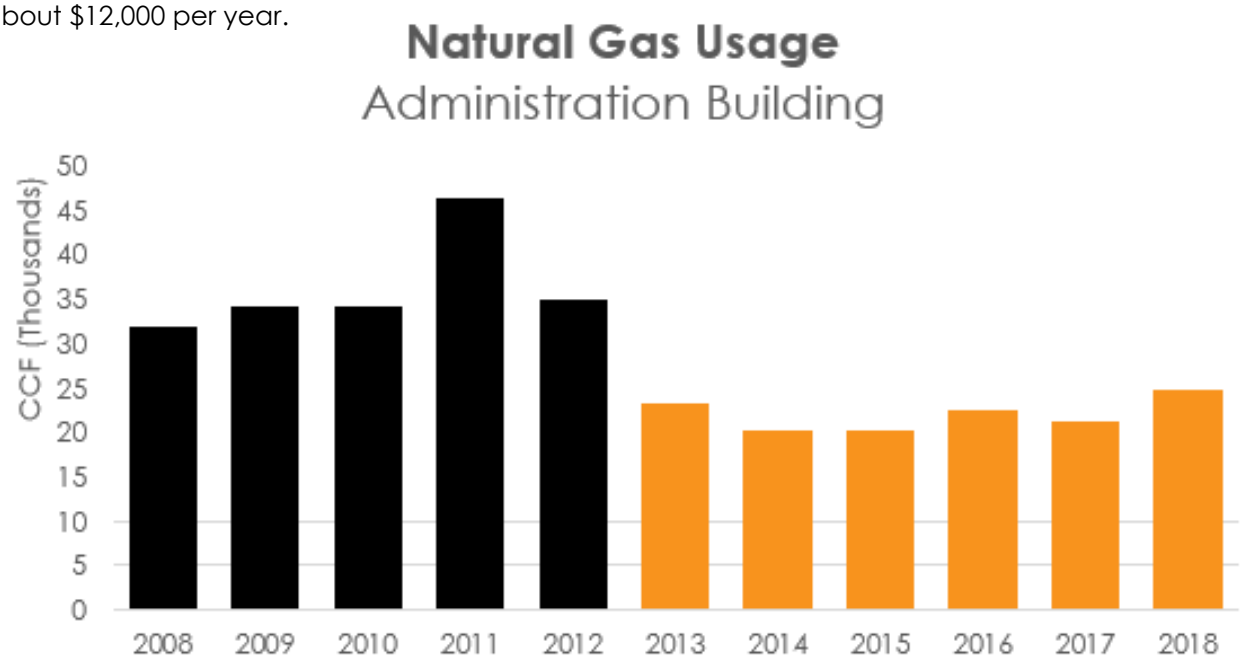
In 2013, MSBSD replaced the roofs on eight buildings:

- Administration
- Butte Elementary
- Finger Lake Elementary
- Houston Middle
- Palmer Jr. Middle
- Snowshoe Elementary
- Wasilla High
- Wasilla Middle

Making these upgrades improved the roofing systems' R-value, that is, the roof's capacity to resist heat flow. On average, MSBSD has saved **$32,039** annually by replacing the roofs.

Case Study

Since having its roof replaced, the Administration Building has seen a 40% reduction in its Natural Gas usage (as seen below). From **FY08-FY12**, an average of 36,281 CCF were used per year. However, from **FY13-FY18**, an average of just 22,054 CCF were used per year. These savings equate to about $12,000 per year.



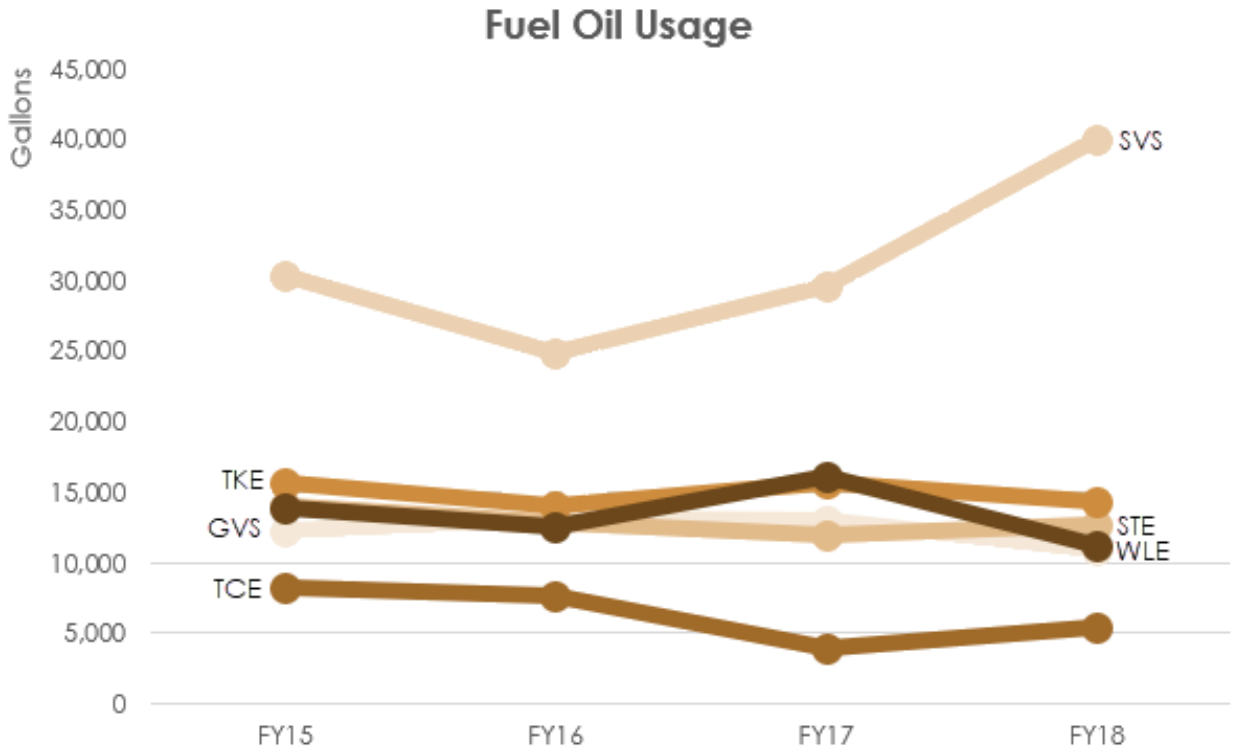
FUEL OIL

Overview

Fuel Oil is not widely used in the Mat-Su Borough School District. However, non-core area schools (including Glacier View, Su-Valley Jr/Sr High, Sutton Elementary, Talkeetna Elementary, Trapper Creek Elementary, and Willow Elementary) receive fuel oil from various vendors.

These schools use fuel oil as al alternative heat source because there is no natural gas infrastructure available in these outlying areas. These schools are more likely to see extreme cold temperatures and using fuel oil helps keep electric costs down while maintaining a comfortable temperature in the school. MSBSD uses #2 heating oil, which has a gelling point of –15*F.

Between FY15 and FY18, MSBSD used **364,616 gallons** of fuel oil, totaling **$879,635**.



Case Study

When evaluated on a gallons used per square foot basis, Trapper Creek Elementary and Willow Elementary use the least amount of fuel oil while Su-Valley Jr/Sr High uses the most. Because of Su-Valley's location, it is frequently used for facility use events. Su-Valley also has the highest student enrollment and staffing numbers of all sites using fuel oil and the largest gymnasium and high bay cafeteria/multi-purpose area of these schools. All of these factors could correlate to an increase in fuel oil consumption.

Site	SF	Average Usage (Gal) FY15-FY18	Usage Per SF (Gal)
Glacier View	20,343	12,346	0.61
Su-Valley Jr/Sr High	48,970	31,194	0.64
Sutton Elementary	25,414	12,928	0.51
Talkeetna Elementary	26,125	14,934	0.57
Trapper Creek Elementary	**16,080**	**6,313**	**0.39**
Willow Elementary	**34,757**	**13,439**	**0.39**

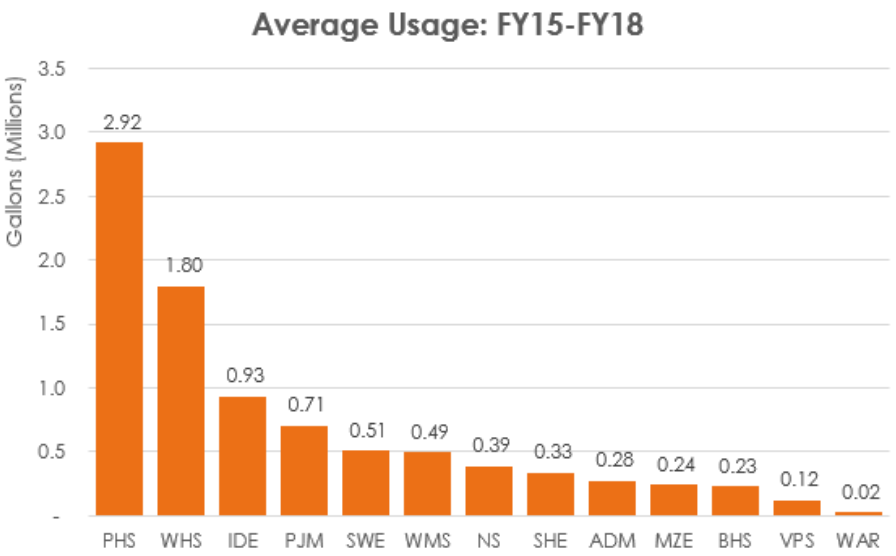
WATER & SEWER

Overview

Several MSBSD schools are on city water:

- Administration Building
- Burchell High
- Iditarod Elementary
- Machetanz Elementary
- Nutrition Services
- Palmer High
- Palmer Jr. Middle
- Sherrod Elementary
- Swanson Elementary
- Valley Pathways
- Warehouse
- Wasilla High
- Wasilla Middle

In FY18, MSBSD used **8,979,408 gallons** of water. Water/sewer services cost the District **$147,284**.



Improvements

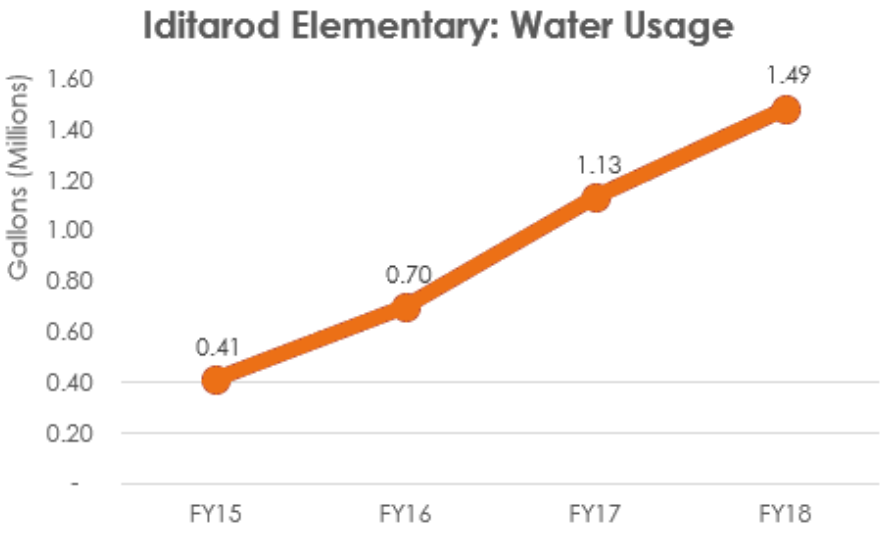
Though only 13 sites are on city water, MSBSD is continuously looking for ways to improve water and sewer efficiencies District-wide.

- *High Efficiency Water Heaters:* By replacing aging water heaters with new energy-efficient water heaters on a break-fix model, the District is able to maintain constant temperatures and supply while greatly reducing electrical and heating usage for domestic water. These water heaters are replaced by Facilities staff. Recent projects include Colony High, Finger Lake Elementary, Glacier View, Teeland Middle, and Trapper Creek Elementary.
- Borough pools installed at Palmer High and Wasilla High contribute to high water usage, as indicated on the chart above. Utilities for the pools are being separated from school utilities, however, which will result in lower water and sewer costs in future years.

Case Study

As shown in the bar chart above, Iditarod Elementary has experienced high water/sewer usage over the last four fiscal years: higher usage, in fact, than several middle and high schools. Usage over time is displayed on the line chart, below.

By using the reports in EnergyCAP, MSBSD was able to identify Iditarod's water usage as an anomaly. Investigative analysis revealed that the system used to track the school's water usage was incorrectly calculating the gallons used and thereby inflating the monthly bills. Efforts are currently underway with the vendor to correct the overpayments.



COMMUNICATIONS

Overview

Internet and broadband services are a large cost driver for the District. Internet costs include actual Internet connections, Wide-Area Network (WAN), long distance, wired telephone, and wireless telephone services. For FY20, MSBSD projects spending **$2,204,189** on Internet needs. Seventy percent of this cost is reimbursed by E-Rate, which is a federal program that provides discounts to assist schools in obtaining affordable telecommunications and Internet access. E-Rate calculates the 70% discount rate each year using School Lunch Program information (free and reduced student eligibility) and the District's Urban/Rural Status. This establishes the Category One (Data Transmission Services and/or Internet Access) and the Category Two (Internal Connections, Managed Internal Broadband Services, and Basic Maintenance of Internal Connections) discount rate, as outlined in the table below.

Discount Rate:

District Enrollment	District NSLP Count	District NSLP Percentage	District Urban/ Rural Status	Category One Discount Rate	Category Two Discount Rate
19,202	8,641	45.0%	Rural	70%	70%

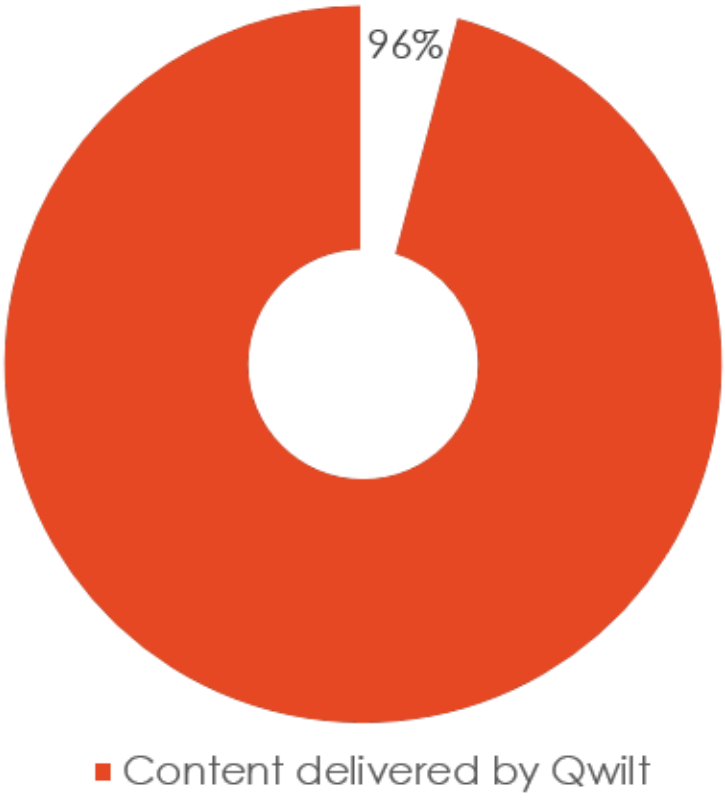
With the proliferation of devices requiring Internet access, the District must project additional Internet resources. Cost projections are developed using historical data and information about technology growth and use in the District.

Improvements

As with other utilities, MSBSD regularly strives to improve Internet services as well. **Qwilt**, an Internet data caching tool, has saved the District significantly in bandwidth usage. After most information (be it a website, operating system update, etc.) is first accessed from the Internet, it is "cached", or saved. Subsequent users then access the data through Qwilt rather than consuming additional bandwidth to repeatedly deliver the same content. This is especially helpful for operating system upgrades and the delivery of media-rich content in classrooms.

There has been a **40%** reduction in Internet traffic since Qwilt's adoption. Even with increases in device connectivity and online content delivery, MSBSD has not had to grow Internet speeds thanks to Qwilt's caching capabilities.

In FY18, MSBSD staff and students accessed 106.7 terabytes (TB) of cacheable content from the Internet. About 96% of that content (102.3 TB) was delivered by Qwilt, as shown in the donut chart to the right. *For reference, one terabyte can hold 1,000,000 photos,*



REFUSE & RECYCLING

Overview

In FY18, MSBSD spent **$290,152** on refuse services District-wide. At the direction of the School Board, the District engaged in a recycling pilot program with Valley Community for Recycling Solutions (VCRS) and the Mat-Su Borough Landfill at three schools: Colony High, Colony Middle, and Pioneer Peak Elementary. The goals of the pilot program were three-fold:

1. Maximize landfill diversion
2. Identify cost savings potential
3. Teach community responsibility to students and staff.

A six-month pilot program included analytics of both landfill and recycling statistics. MSBSD found that **21.32 tons** of refuse (or about **20%** of all refuse) had been diverted from the landfill. From this data, the District extrapolated a per-pupil ratio for placing recycling bins at each school level, set a pick up schedule for each location, and estimated that a District-wide recycling program would approximately break even with current refuse service costs.

Improvements

A contract was awarded for recycling services at 31 schools, beginning in FY19. Recycling services are provided by MSBSD's Next Step program at five additional locations. A Northern Valley recycling program was also implemented in 2019.

MSBSD focuses on three main components to help ensure the success of the recycling program:

- *Internal site collection and education.* 96-gallon bins were placed strategically around schools to facilitate the collection of **cardboard and mixed paper**.
- *Backhaul of recyclable material to a recycling facility.* On pick up day, custodians collect the bins and place them outside in a designated location for pickup by Alaska Waste.
- *The recycling center.* Alaska Waste works with VCRS to process the recyclable material.