



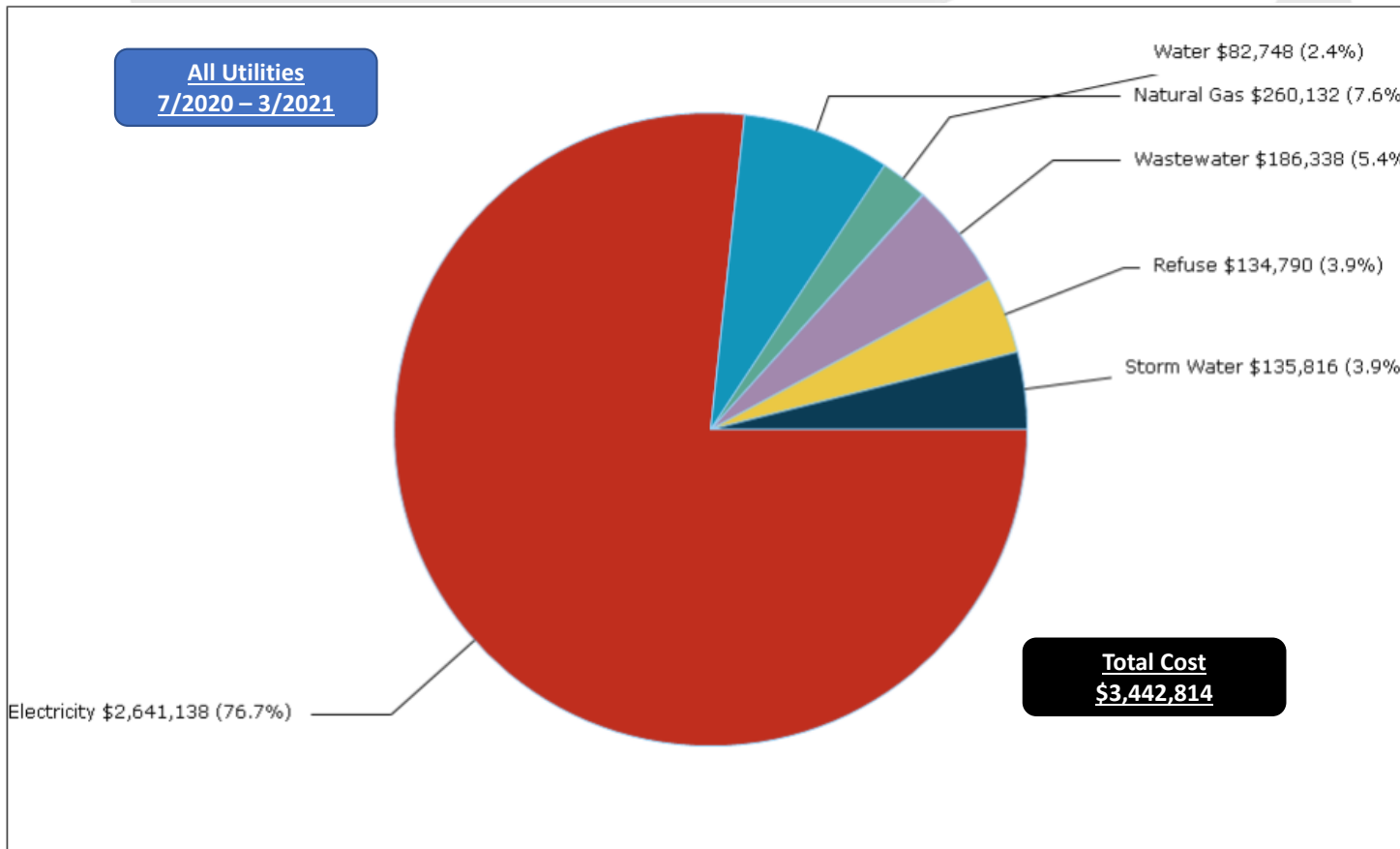
SY 2020-2021, $\frac{3}{4}$ Year Energy Report

July 2020 – March 2020

Kim Melander, Energy Manager

6/14/2021

One Team. One Mission. One Rock Hill.

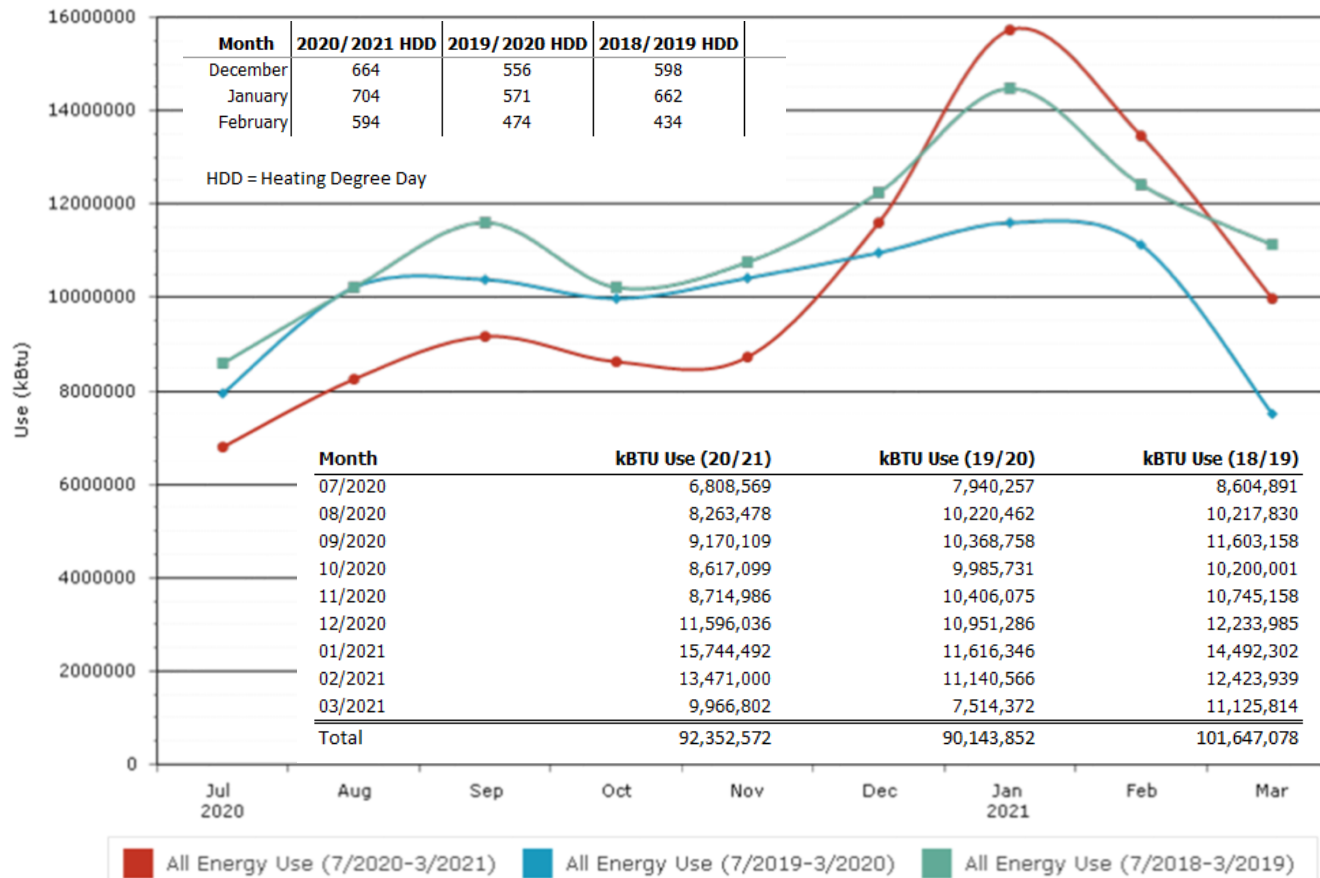


This pie-chart graphic shows our different utility costs by percentage for the period of July, 2020 through March, 2021.

Historical Data by Service
Rock Hill District 3
All Facilities -- 7/2020 to 3/2021



Total Energy Usage



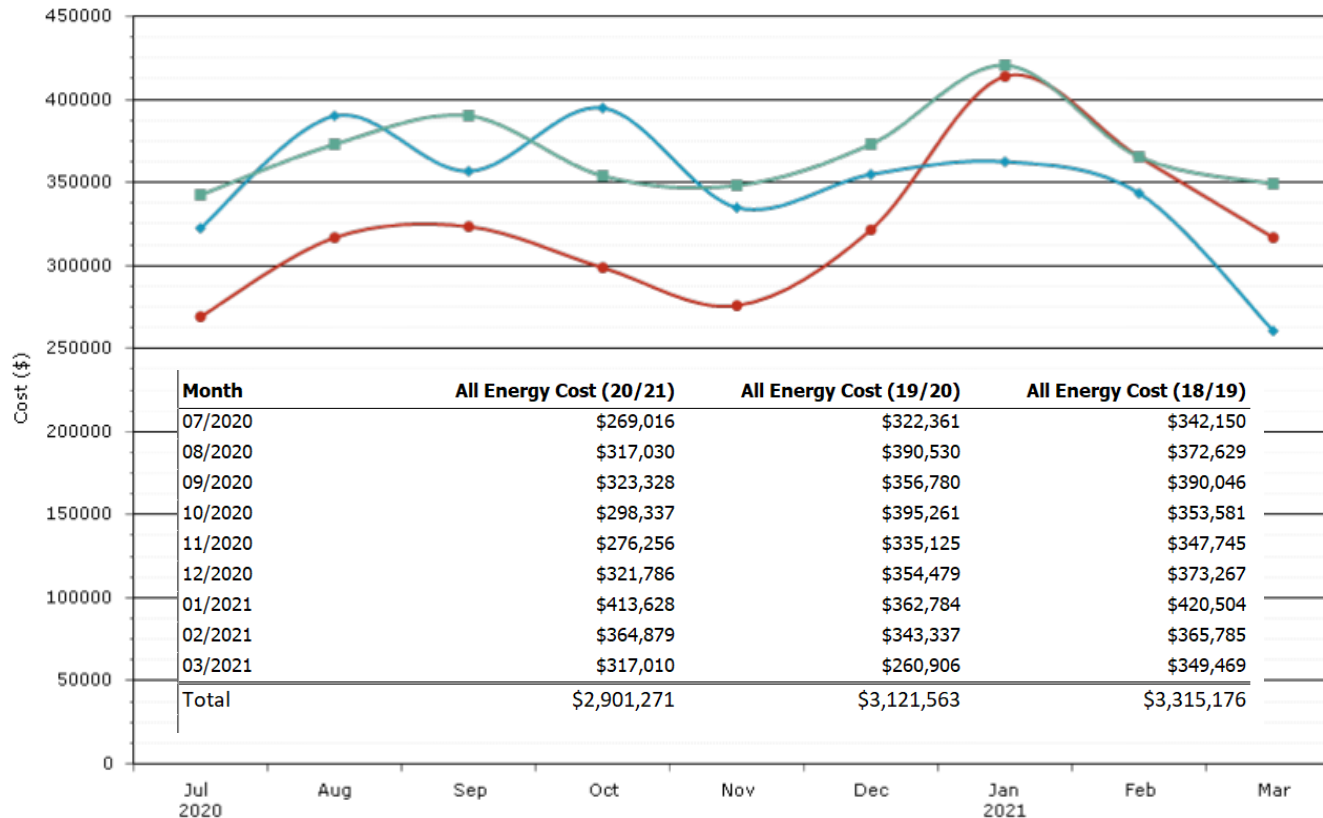
- This chart compares our total electricity and natural gas consumption for 3 years.
- Notice the significant reduction for the 20/21 SY until November. At this point, the line turns up sharply and even exceeds the previous years in January and February.
- The major factors that contributed to this increase in energy consumption:
 1. Colder weather.
 2. HVAC operating modifications to help mitigate possible COVID-19 transmissions.

Degree days assume that when the outside temperature is 65°F, we don't need heating or cooling to be comfortable. Degree days are the difference between the daily temperature mean, (high temperature plus low temperature divided by two) and 65°F. If the temperature mean is above 65°F, we subtract 65 from the mean and the result is *Cooling Degree Days*. If the temperature mean is below 65°F, we subtract the mean from 65 and the result is *Heating Degree Days*.

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Historical Data by Service
Rock Hill District 3
All Facilities -- 7/2020 to 3/2021

Total Energy Cost



■ All Energy Cost (7/2020-3/2021)
 ■ All Energy Cost (7/2019-3/2020)
 ■ All Energy Cost (7/2018-3/2019)

• Like our consumption chart on the previous slide, the total energy costs for the 20/21 SY followed the same trend line.

Outdoor Air Heating Energy Calculation



Previously, we noted that the modifications made to the HVAC systems to mitigate the possible spread of COVID-19 had a significant impact in increasing our energy consumption and costs. This slide illustrates why.

The example calculation to the right shows the estimated cost impact of increasing outdoor air introduction rates by 5% during the HEATING season. It represents a typical single zone HVAC unit serving a single classroom space. This calculation is for the added energy and cost of conditioning the outdoor air only. In this example, increasing the outdoor air rate from 10% to 15% results in a 49% increase in energy costs.

Calculate the HEATING energy cost of increasing outdoor air flow introduction to HVAC system from 10% to 15%

Unit total airflow	2000 CFM		
10% Outdoor air	200 CFM	cost = \$0.38/hr, \$3.04/day, \$61/mo.	
15% Outdoor air	300 CFM	cost = \$0.57/hr, \$4.56/day, \$91/mo.	49% increase in cost

Desired air conditions @ 676 ft. above Sea Level (Rock Hill, SC)

Dry Bulb Temperature (Db)	72 deg. F.
Relative Humidity (Rh)	50%
Enthalpy Sensible (Es)	17.27 BTU/lb.
Enthalpy Latent (EL)	9.39 BTU/lb.
Specific Volume (Sv)	13.98 CF/lb.

Entering Air conditions (Heating)

Dry Bulb Temperature (Db)	30 deg F.
Relative Humidity (Rh)	25%
Enthalpy Sensible (Es)	7.19 BTU/lb.
Enthalpy Latent (EL)	0.96 BTU/lb.
Specific Volume (Sv)	12.72 CF/lb.

Sensible heat to add:
 $17.27 \text{ BTU/lb.} - 7.19 \text{ BTU/lb.} = 10.08 \text{ BTU/lb.}$

Mass flow - CFM to lb./hr.
 $(100 \text{ CFM} / 12.72 \text{ CF/lb.}) (60 \text{ min/hr}) = 471.7 \text{ lb./hr}$

Total heat to add:
 $(471.7 \text{ lb./hr.}) (10.08 \text{ BTU/lb.}) = 4,754.7 \text{ BTUH}$

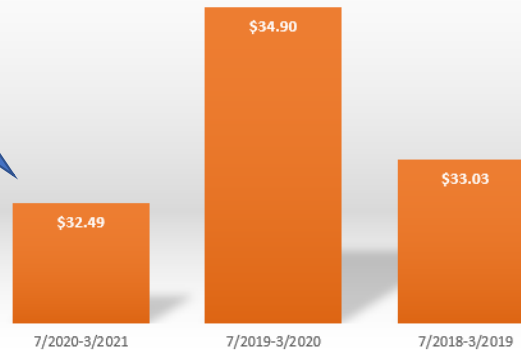
Unit Conversion (Electric Heat) - BTUH to kWh:
 $4,754.7 \text{ BTUH} / 3,412 \text{ BTUH/kWh} = 1.39 \text{ kWh}$

Cost per hour/100CFM of OA:
 $(1.39 \text{ kWh}) (\$0.14/\text{kWh}) = \$0.19/\text{hr.}$

Our average total energy cost per unit was 6.9% less this year than the previous period. We saw a 5.7% increase between 18/19 and 19/20.

Our average electricity cost per kWh was 4.9% less than the previous period. There was a 5.2% increase between 18/19 and 19/20.

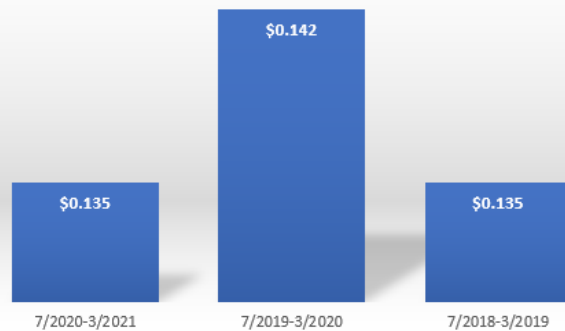
\$/MMBTU



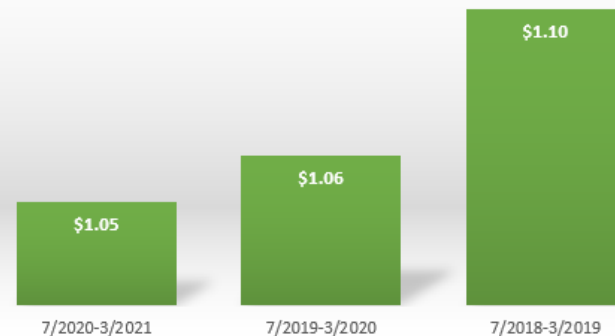
Definitions:

- BTU = British Thermal Unit. A measure of heat content. 1 BTU is the amount of heat necessary to raise the temperature of 1 pound of water, 1 degree Fahrenheit.
- MMBTU = 1,000,000 BTU
- kWh = Kilowatt-hour. 1 kWh = 1000 Watthours. It is the measure of energy that a 1000-Watt light bulb would consume in 1 hour of time.
- Therm = measure of Natural Gas consumption. 1 Therm = 100,000 BTU of energy.

\$/kWh (electricity)

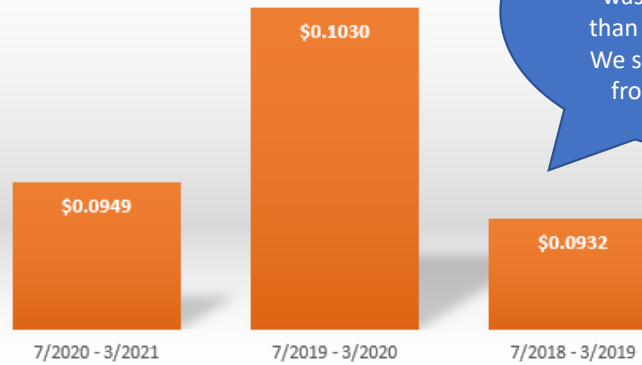


\$/Therm (natural gas)



Our average natural gas cost per Therm was 0.9% less in 20/21 than the previous period. There was a 3.6% reduction between 18/19 and 19/20.

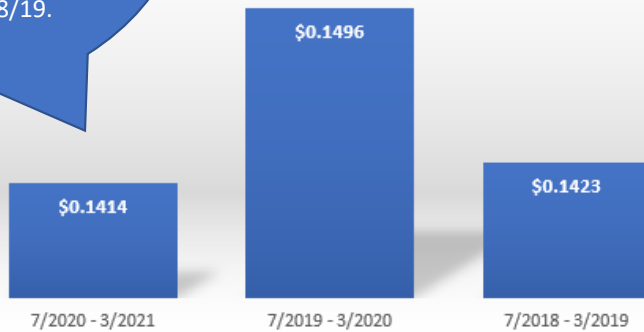
Duke \$/kWh



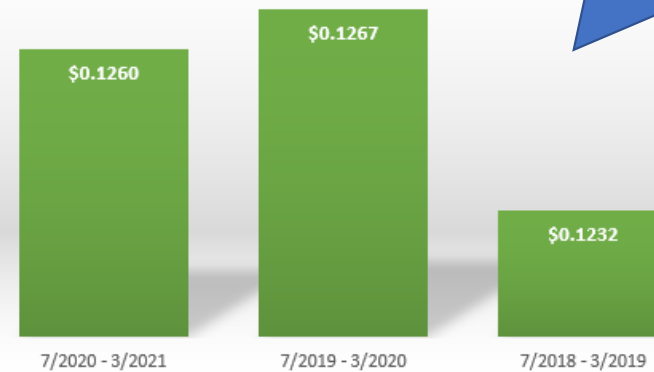
Our average electricity cost from Duke Energy was 7.9% less this year than the previous period. We saw a 10.5% increase from 18/19 to 19/20.

Our average electricity cost from the City of Rock Hill was 5.5% less this year than the previous period. In July of 2020, the City implemented a new Public School electric utility rate. We saw a 5.1% increase in cost in 19/20 compared to 18/19.

CORH \$/kWh



YEC \$/kWh



Our average electricity cost per unit from York Electric Cooperative was 0.6% less this year than the previous period. We saw a 2.8% increase in 19/20 compared to 18/19.

Vendor Use & Cost Ranking
 Rock Hill District 3
 City Of Rock Hill -- 7/2020 to 3/2021

Vendor	Electricity (kWh)	Electricity Cost	Electricity Cost/kWh
City Of Rock Hill	16,095,480	\$2,268,449	\$0.1409
Grand Total	16,095,480	\$2,268,449	\$0.1409

Vendor Use & Cost Ranking
 Rock Hill District 3
 Duke Energy -- 7/2020 to 3/2021

Vendor	Electricity (kWh)	Electricity Cost	Electricity Cost/kWh
Duke Energy	2,232,596	\$210,799	\$0.0944
Grand Total	2,232,596	\$210,799	\$0.0944

Vendor Use & Cost Ranking
 Rock Hill District 3
 York Electric -- 7/2020 to 3/2021

Vendor	Electricity (kWh)	Electricity Cost	Electricity Cost/kWh
York Electric	1,288,436	\$161,890	\$0.1256
Grand Total	1,288,436	\$161,890	\$0.1256

If we apply the Duke Energy Cost/kWh to the City of Rock Hill consumption, we can estimate an approximate savings of \$749k. Projecting this figure out to a full year, the difference is about \$1M. The CORH cost per unit is 49% higher than the Duke Energy cost. If the CORH rate were to match the Duke rate over the next 4 years, we would expect to see about a 12% reduction, or \$250K annually.

City of Rock Hill Accounts

- Applied Tech. Center
- Belleview ES
- Castle Heights MS
- Central Child
- Central Office
- Cherry Park ES
- Dist. 3 Stadium
- Dutchman Creek MS
- Ebenezer ES
- Ebinport ES
- Facilities Services
- Finley Road ES
- Flex Learning Center
- India Hook ES
- Northside ES
- Northwestern HS
- Old Pointe ES
- Rawlinson Road ES
- Richmond Drive ES
- Rosewood ES
- Safety/Security Bldg.
- Sullivan MS
- Sunset Park ES
- Sylvia Circle
- Saluda Trail MS
- South Point HS
- Transportation
- York Road ES

Duke Energy Accounts

- Carroll School
- Independence ES
- Lesslie ES
- Rock Hill HS

York Electric Cooperative Accounts

- Mount Gallant ES
- Mount Holly ES
- Oakdale ES