Charlottesville City Schools Annual Energy and Water 2020 Performance Report- *Executive Summary*

July 2021

The City of Charlottesville's Energy and Water Management Program (EWMP) monitors and manages energy and water usage at all municipal and school sites. It has continued its strong partnership with Charlottesville City Schools (CCS) set in place by the energy and water saving goals in the 2019 Resolution for Charlottesville City Schools Energy and Water Performance. This report expands on information presented in the Charlottesville City Schools 2019 Annual Energy and Water Performance Report and gives an overview of actions and the energy and water performance of the schools in the 2020 calendar year.

Key 2020 Performance Findings

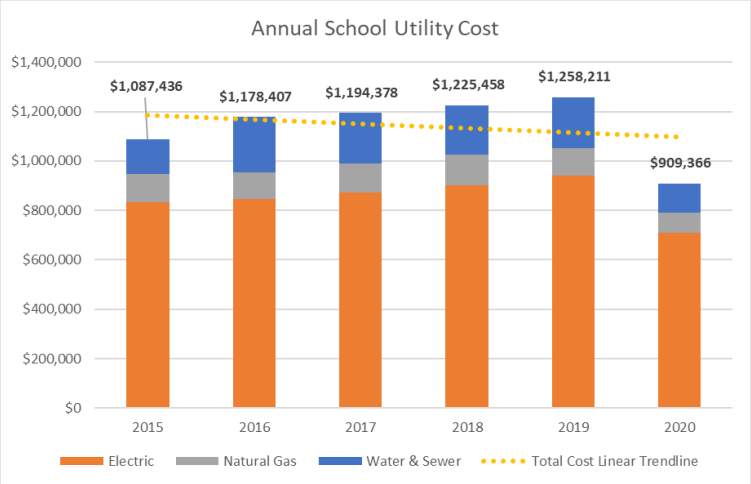

Figure 1: *Charlottesville City School's utility spending for the past 5 years for each commodity type across all school facilities.*

The year 2020 will forever be a unique year for the world due to the Coronavirus (COVID-19) and the impact it had on building performance. COVID-19 is a large part of the story in this 2020 report as it impacted an essential driver in energy and water use: building occupancy. In 2020, the school portfolio spent just over $900,000 on energy and water utilities, which was well below a typical year where CCS spends closer to $1.2 million annually (Figure 1). Even with utility rates increasing, the portfolio saw a significant decline in cost because of the COVID-19 response which caused all CCS facilities to be shut down for a portion of 2020 and then run at reduced occupancy. CCS saw a 19% decline in electricity usage, a 9% decline in natural gas usage, and a 36% decline in water usage compared to the portfolio baseline year of 2015. The majority (approximately 66%) of the utility savings came from electric costs with an estimated $230,361 saved when comparing 2020 to 2019 electricity costs. Water and sewer also saw a large decline in costs and contributed 25% of total savings and estimated just over $87,000 saved from utility costs when comparing 2020 to 2019. The largest total utility savings occurred during April and May of 2020, when facilities were almost completely shut down as a result of COVID-19.

The average ENERGY STAR score across the CCS portfolio in 2020 was 67 (54 in 2019) and the average EUI was 48.9 kBtu/sq.ft. (65.3 kBtu/sq.ft. in 2019). Again, the reduction in the EUI and increase in the ENERGY STAR score last year was mainly due to reduced occupancy and operations in schools due to

COVID-19 response. Although there were likely improvements in efficiency that contributed to this, the Energy and Water Management Team (EWMT) attributes most of the energy reductions to the changes in operations and can expect energy usage to increase back to pre-COVID-19 levels when "normal" school operations resume. The EWMT is consulting ENERGY STAR recommendations for adjusting the attributes that generate the score for each facility to account for the reduced operations in 2020 and to help normalize the ENERGY STAR score, making the score more legitimate as a representation of operational efficiency.

The CCS portfolio had seen a downward trend in greenhouse gas (GHG) emissions and then a leveling off from 2015 to 2019, but with the major reductions seen in energy usage at CCS facilities in 2020 due to COVID-19, GHG emissions saw a sharp decline (28.0%). Given that the large reduction in GHG emissions seen in 2020 was from responses to COVID-19 rather than actual efficiency gains, they do not give an accurate picture of progress toward the City's greenhouse gas reduction goal. The treatment of the data to normalize for this anomaly year is still being determined.

2020 CCS Performance Report Dashboard
A Dashboard of all the data included in the 2020 Annual Performance Report with interactive options and detailed data can be viewed at EnergyCAP 2020 CCS Performance Report Dashboard.

2020 Program Actions and Highlights

Operational Actions

- Monthly meetings (virtual) of **Energy and Water Management Team** and CCS staff to discuss operations and performance
- Monthly **utility tracking** of CCS facilities to help monitor operations during COVID-19
- Reviews of and improved communication around **HVAC schedules** to follow varied operational needs in response to COVID-19

Management Team (EWMT) seen here coordinating via Zoom during COVID-19.

Technological Actions

- **Launched EnergyCAP utility management software** for remote monitoring and data analysis
- **Installation of LED lighting** as part of classroom modernization project at Buford Middle
- **Upgrades to HVAC Equipment** at Clark Elementary and Walker Upper Elementary

Behavioral Actions

- **Continued Energy and Water Management Campaign** at CCS with quarterly educational outreach efforts through announcements and posters. Quarterly topics included:
  - Spring: Reduce our Energy and Water Waste
  - Summer: Keep Going- Summertime Savings!
  - Fall: New School Year, New Commitment to Save Energy and Water!
  - Winter: Pick an Action, Do an Action!
- **Employee engagement** around working with Facilities Maintenance on comfort issues to reduce energy and water use from HVAC and eliminating the use of space heaters

Charlottesville City Schools
2020 Annual Energy and Water Performance Report

July 2021

Energy & Water Management Program
City of Charlottesville

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Introduction

The City of Charlottesville's Energy and Water Management Program (EWMP) has continued its strong partnership with Charlottesville City Schools (CCS) set in place by the energy and water saving goals in the 2019 *Resolution for Charlottesville City Schools Energy and Water Performance* (Appendix 1). With CCS contributing a small but still important portion to the total Charlottesville community greenhouse gas (GHG) emissions footprint, these efforts are significant in supporting the City's community-wide goal of achieving a 45% reduction in greenhouse gas emissions by 2030 and carbon neutrality by 2050. The EWMP continues to track the energy and water usage at school facilities to gauge performance, coordinate with the City's Facilities Maintenance and Facilities Development teams on building operations and improvement projects, work with City and CCS staff to develop strategies that expand the renewable energy footprint of the schools, and engage with students and staff to help lessen their impact on energy and water usage.

This report expands on information presented in the Charlottesville City Schools 2019 Annual Energy and Water Performance Report (Appendix 2). Building off the well-established performance baseline of information and data from the 2019 report, the EWMP has captured actions and the energy and water performance of the schools in the 2020 calendar year.

COVID-19

The year 2020 will forever be a unique year for the world due to the Coronavirus (COVID-19) and the impact COVID-19 had on building performance. In mid-March 2020, City facilities, including schools, were closed due to Virginia State and the Center for Disease Control guidelines for people to shelter in place as the world faced the threat of a global pandemic. As a result, students started to learn remotely, and CCS facilities were shut down completely - only running essential services to keep issues like humidity controlled with the help of the City's fast acting Facilities Maintenance staff. This new trend of reduced occupancy and utility usage continued through most of 2020. The impact this action had on the school's performance is further explored in the Performance section of the report. CCS did start opening some of their facilities in limited capacity to staff in the summer months including using CCS facilities to help provide lunches to students. The CCS facilities continued to slowly open more once school started in the fall; however, it was an atypical start to the school year as remote learning continued through the end of 2020.

COVID-19 is a large part of the story in this 2020 report as it impacted an essential driver in energy and water use: building occupancy. COVID-19 created the new challenge of tracking any changes implemented by the EWMP to increase efficiency; this report makes clear that decreases in utility usage were primarily driven by the low to no occupancy of these facilities for a large portion of the year. The EWMP will continue to explore how to handle this unique year in CCS's portfolio performance.

Actions and Performance

Building off the foundational data and information established in the CCS 2019 Annual Energy and Water Performance Report, this report explores progress made in 2020 using utility usage and cost data (Appendix 2). The report incorporates the three focus areas identified to improve energy and water

performance: operations, technology, and people. In addition to performance, some of the actions discussed were significantly impacted by COVID-19 resulting in actions to be delayed, cancelled, or modified.

Glossary

Building Automation System (BAS): A control system in buildings that allows monitoring and control of heating, ventilation, and air conditioning (HVAC) systems, lighting, and other building equipment through a common interface.

Benchmarking: The practice of comparing the measured utility performance of a building overtime to itself or relative to other similar buildings.

Better Business Challenge (BBC): Local challenge being hosted by the Community Climate Collaborative to bring businesses together to work toward reducing their overall greenhouse gas impact and improve efficiency in their buildings.

Metric Tons of Carbon Dioxide Equivalent ($MTCO_2e$): Unit used for aggregating different greenhouse gases (e.g., carbon dioxide, methane, nitrous oxide) into one common unit. This takes the global warming potential for each greenhouse gas (how much heat each gas traps in the atmosphere, relative to carbon dioxide) and uses that to convert the emissions of that gas to carbon dioxide equivalent measured in metric tons.

Cubic Feet (cf): Unit of measurement used for natural gas and water utility.

Calendar Year (CY): Unit of time looking at measurements made from January 1st through December 31st of that year.

Capital Improvement Project (CIP): Project requiring capital expenditure and specified approval annually for City and School budgets.

Charlottesville City Schools (CCS): Charlottesville City Schools are the City of Charlottesville's public school division.

Coronavirus (COVID-19): The coronavirus is an infectious disease that impacted the entire world brought on by a newly discovered coronavirus in 2019, giving it the name COVID-19.

Department of Mines, Minerals, and Energy (DMME): State agency established to facilitate energy, geology, and mining programs within Virginia.

Energy and Water Management Program (EWMP): A program run by the Energy and Water Management Team that manages utility usage for all City facilities.

Energy and Water Management Team (EWMT): A group of Public Works Department City staff with representation from the Facilities Maintenance, Facilities Development, and Environmental Sustainability Divisions.

Energy Performance Contract (EPC): An agreement between an entity and a contractor (typically an ESCO) to perform building upgrade services that provide guaranteed energy savings.

Energy Services Company (ESCO): A contractor that provides the services agreed to in an energy performance contract.

EnergyCAP: Software platform used by the City to monitor utility usage and costs.

ENERGY STAR Score: A performance indicator ranging from 1 to 100 established by the Environmental Protection Agency's (EPA) ENERGY STAR program. This performance indicator compares a building's utility performance to other similar building types with normalization of weather and operational differences (e.g., occupancy, plug load, and operating hours). A higher ENERGY STAR score indicates a better building performance where a score of 50 represents a building with a median energy performance compared to its peers.

Energy Use Intensity (EUI): The EUI is a measure of how much energy a building uses per square foot. To get the EUI, the total energy usage (e.g., electricity and natural gas) is converted to a common unit known as kilo-British thermal units (kBtu) and this is divided by the total square footage of the building. Typical EUIs can range from 40 – 70 kBtu/sq.ft. depending on the property type and the lower EUI value, the less energy intensive the facility.

Greenhouse Gas (GHG): Gases that absorb infrared radiation and contribute to the greenhouse effect (warming) of the Earth. The primary greenhouse gases include water vapor, carbon dioxide, methane, nitrous oxide, and ozone.

Heating, Ventilation, and Air Conditioning (HVAC): Equipment or system that controls thermal comfort within a built environment. Includes equipment such as air handlers, chillers, cooling towers, and boilers.

Kilo British Thermal Units (kBtu): Unit of measurement for energy. One Btu (British Thermal Unit) is defined as the amount of heat required to raise the temperature of one pound of water by one-degree Fahrenheit. 1 kBtu is equal to 1,000 Btus.

Kilowatt-hour (kWh): Unit of measurement for power, the rate at which energy is generated or consumed. Used to measure electricity consumption.

Light-Emitting Diode (LED): A semiconductor that emits light when a current passes through it. LEDs typically use less energy and last longer than traditional light sources (e.g., incandescent, fluorescent, halogen).

Solar Power Purchase Agreement (PPA): A financial agreement with a developer where the developer facilitates the design and installation of a solar system and charges the customer a fixed electricity rate for the power generated, typically below the current market electricity rate. The developer maintains the system through the end of the contract term and at the end, the customer may choose to extend the contract, purchase the system, or have the developer remove it.

STEM (Science, Technology, Engineering, and Mathematics): Grade school subject that brings in concepts of science, technology, engineering, and mathematicises together in one academic discipline. At CCS, this subject is called "iSTEM" which stands for Instructional STEM.

Weather Normalization: A method of estimating the impact of weather on energy consumption and adjusting consumption to remove weather variance from year to year. Typically uses degree days (the number of days that exceed or go below a balance point temperature multiplied by the extent to which the daily average deviates from the balance point temperature). If the average temperature is above the balance point, that day would be considered a cooling degree day (CDD). If the average temperature is below the balance point, that day would be considered a heating degree day (HDD).

Operations

As mentioned in the 2019 CCS Report (Appendix 2), the efficient operations of facilities represent the lowest cost but potentially the highest impact opportunities for achieving energy and water reductions. These include examining the control and maintenance of heating, ventilation, and air conditioning (HVAC) systems and lighting in facilities, then aligning this with the current needs of building occupants. The goal is to run equipment optimally and efficiently and eliminate unnecessary operations. At the start of 2020, the EWMP's objective was to ensure that schools did not operate more than necessary, and heating systems were running as efficiently as possible under the normal school year operations. However, moving into March 2020 and as official responses to COVID-19 were being rolled out, the operations of schools had to pivot based on the new use requirements of the facilities.

The Facilities Maintenance Division was tasked with scaling facility operations to meet this changing need and with implementing safety measures within facilities that prevented the spread of COVID-19, including HVAC equipment measures (e.g., MERV 14 filters, bi-polar ionization, UV light filtration, extended ventilation operation) and expanded sanitation measures. Facilities Maintenance was on the frontlines of keeping schools operating in a way that created a safe working environment for occupants while at the same time preventing operations in areas that were unoccupied. Throughout 2020, balancing safety with efficiency has been the largest effort.

Strategies Implemented

Energy and Water Management Team

Image 1: *The Energy and Water Management Team (EWMT) is currently comprised of Kirk Vizzier (Environmental Sustainability), Jill Greiner (Environmental Sustainability), Kristel Riddervold (Environmental Sustainability and Facilities Development), and Mark Zavicar (Facilities Maintenance) and are seen here coordinating via Zoom during COVID-19.*

The Energy and Water Management Team (EWMT) was created in 2018 to pull together expertise from the Environmental Sustainability, Facilities Maintenance, and Facilities Development Divisions to aid in facilitating the Energy and Water Management Program (Image 1). Throughout 2020, the EWMT continuously collaborated to stay on top of changing requirements the City had with operating facilities (including schools) while monitoring and maximizing energy and water performance. Since 2019,

members from the EWMT have met with the CCS administration monthly to discuss school utility performance. This continued into 2020 to maintain communication about how school energy and water performance was being affected by safety measures taken in response to COVID-19.

Utility Tracking & Investigation

The EWMT uses several tools to track electricity, natural gas, and water/sewer usage at CCS facilities including EnergyCAP (utility tracking and analysis software), Tableau (data visualization tool), SAP, and ENERGY STAR Portfolio Manager. These tools provide the ability to monitor utility usage and costs effectively and efficiently and quickly identify issues or concerning trends that should be addressed. They also provide the ability to pinpoint where adjustments were made to operations or where equipment was replaced so that the impact these actions had on a school's utility performance can be quantified.

With these tools in place, the EWMT was able to remotely monitor the operations of facilities in 2020 through the utility data, allowing the team to be effective in a remote work situation. The EWMT coordinated monthly with the Facilities Maintenance representatives that support schools to communicate any findings, providing another set of eyes on how schools were "behaving" as operating schedules continued to fluctuate throughout the year.

HVAC Schedules & Communication

The importance of scheduling HVAC operations appropriately and maintaining effective communication between occupants and the HVAC maintenance representatives was touched on in the 2019 EWMP Report and has continued to remain a major factor in controlling energy and water performance in schools. In particular, 2020 provided a unique testing ground to show if this was being done effectively, as schools had shifting occupant needs throughout the year.

School occupancy began to ramp down in March 2020 and had virtually no students or staff through June 2020. Occupancy began to ramp up gradually in July 2020 but didn't see more consistent staff occupancy until September 2020. Although occupancy was reduced, staff were typically spread out throughout the schools, and thus HVAC systems had to run on a more normal occupancy schedule starting in July to maintain comfort in all areas of schools.

The Facilities Maintenance team adjusted operating hours of equipment to match the updated needs as they shifted throughout the year. Additionally, the team made an effort to scale back HVAC operations in areas that did not require heating or cooling (Note: HVAC measures to maintain safety in response to COVID-19 were implemented in all appropriate areas regardless of this). School staff and Facilities Maintenance had to maintain good lines of communication regarding the needs of the school at any given time. Another interesting point is that with reduced occupancy, there is less heat that naturally occurs in spaces from body heat and the use of electronics such as computers. School facilities experienced this lack of body heat and heat from electronics towards the end of 2020 in the cooler months, and heating systems had to operate longer to maintain comfort levels in classrooms and throughout schools.

Strategies Planned and 2021 Outlook

School operations during the first quarter of 2021 were very similar to the end of 2020, and as students begin to return to in-person learning, the same strategies outlined above will be utilized to control the energy and water usage at school facilities throughout the year. COVID-19 HVAC measures that were put into place, in many cases, had an energy penalty (caused energy usage to increase). Even once occupancy levels return to normal, as long as those measures are still in place, HVAC energy usage will have a baseline increase over the normal operating years prior to 2020. This is to be expected and puts a greater emphasis on managing energy usage through monitoring and scheduling operations appropriately.

Technology

In previous years, the City has annually implemented projects that cycle in more efficient systems that will ultimately improve the efficiency of school facilities. Building equipment (e.g., HVAC, BAS/control systems, lighting, plumbing fixtures) continues to increase in efficiency and offers greater abilities to reduce energy and water usage at schools. The existing funding mechanisms have allowed for gradual upgrades of equipment over time that address equipment efficiency. However, to ensure that emergency funding was in place to support COVID-19 response, the City put a temporary hold on most projects slated for 2020. This meant that only the most urgent projects were allowed to move forward, including a roof repair at Charlottesville High School, a remodel of an engineering classroom at Buford Middle School, and the replacement of rooftop heat pumps at Walker Upper Elementary. Although construction projects were mainly placed on hold in 2020, technology was utilized in a myriad of ways over the year to manage energy and water usage.

Strategies Implemented

Utility Tracking Software and Data Analysis/Visualization Tools

As mentioned earlier, the EWMT utilizes a few different tools for tracking and analyzing utility data: EnergyCAP, Tableau, SAP, and ENERGY STAR Portfolio Manager. Utility tracking is mostly done through EnergyCAP to compile all of the utility accounts and facilities in the City together for efficient and effective analysis and management. In early 2020, the EWMT switched from a previous utility tracking software to EnergyCAP, as the software provides automatic utility bill updates for any of the City's utility accounts rather than updating the data manually and is a widely used platform by other Virginia localities. EnergyCAP is a well-established utility tracking software that has continued to roll out new tracking features including the recent improvements in data submissions to ENERGY STAR Portfolio Manager and pulling ENERGY STAR scores for tracking and reporting within EnergyCAP.

In the winter of 2020, the EWMT received a multi-day long training on the software and shortly afterwards officially launched the use of the software. The EWMT uses EnergyCAP to regularly review the utility data of schools to inform monthly reports and identify trends or issues that might require further investigation. There is also a viewable dashboard the EWMT has made available to CCS with information on specific facilities' performance. The data provided in this report can also be viewable and interacted with in an EnergyCAP dashboard outlined in Appendix 3.

The EWMT also has access to natural gas and water and sewer data in SAP to investigate specific meter information from the Charlottesville Gas and Charlottesville Water Utility. Additionally, Tableau data visualization software is used to develop more customized analysis and reporting beyond what EnergyCAP offers. EnergyCAP released (as of May 2021) upgrades to the software that will allow data to be more easily integrated with Tableau creating greater synergies between these two tools. The EWMT is exploring ways to utilize these advances to enhance how data is reviewed and communicated to CCS and the public.

Installation of LED Lighting

Light-Emitting Diodes (LEDs) have become the preferred lighting technology used in projects at City facilities and when lighting is being replaced as part of remodeling projects at schools, LEDs are installed. The Buford Middle School engineering classroom, remodel in 2020, included an upgrade of the existing fluorescent lighting to LED flat panels. The LEDs will lessen the energy used from lighting in the space and will provide a better quality of light (higher visual acuity) making objects in the classroom appear more clearly to students and staff. LED upgrades will continue to be worked into remodeling projects and will become more widespread as opportunities to address older lighting technologies across all schools are identified.

Replacing HVAC Equipment

HVAC equipment replacement is typically a high cost endeavor that is budgeted as far as 5 years in advance to plan accordingly and is primarily focusing on older equipment that is reaching the end of its useful life. Although COVID-19 restrictions on project spending did slow down projects, five rooftop heat pump units supporting the gym, auditorium, and cafeteria at Walker Upper Elementary were replaced, which will provide greater ability to supply conditioned air and to control comfort levels in these areas. Additionally, boilers that provide space heating at Clark Elementary were replaced with more efficient models. Further projects are being considered for 2021 including replacing make-up air units at Walker Upper Elementary, unit ventilators on the Johnson Elementary gym, and the chiller at the MLK Performing Arts Center at CHS.

Upgrading Building Automation Systems

Building automation systems (BAS) located at each school control the HVAC system and lighting in most of Charlottesville City Schools. The BAS provides the ability to monitor HVAC settings and schedules that have a direct impact on energy usage from building operations. Newer systems tend to have more advanced capabilities to monitor specific settings, trend performance data, and generally a more intuitive interface that better equips Facilities Maintenance staff to control the building. An advanced BAS also aids in the ability to implement energy management strategies through programming algorithms to auto-adjust for changing building conditions or getting real-time data to the maintenance team to make operational adjustments quickly.

Typically, the City has upgraded outdated BAS's on a frequency of one school per year. Venable Elementary was planned for Summer 2020 but had to be postponed until Summer 2021 due to the COVID-19 restrictions.

Project Rebate Programs Through the PJM Regional Transmission Organization

The Energy Efficiency program through the Pennsylvania, Jersey, Maryland (PJM) Regional Transmission Organization offers financial incentives to organizations to implement projects that improve energy efficiency and reduce the energy usage at a location. Projects have the opportunity to receive a quarterly financial incentive for up to four years after the projects are completed. The City allocates these payments to a dedicated energy and water efficiency fund.

The City entered into an agreement in 2018 to participate in this program and the EWMT submitted a chiller replacement project that was implemented at Charlottesville High School in 2016. This was approved and starting in Fall 2019, PJM provided a payment of approximately $500 that has continued to be paid each quarter throughout 2020. Since the chiller replacement at Charlottesville High School was completed in 2016 and 2017 was the first full year of savings, 2020 marks the fourth year after installation and will be the last year the project is eligible for payment. The EWMT submitted the five rooftop heat pump installations at Walker Upper Elementary and is awaiting the final approval for the program.

Energy Savings Performance Contract (ESPC)

The EWMT has been investigating an energy savings performance contract (ESPC), an alternative method for financing and implementing projects. An ESPC is presented as a budget-neutral approach whereby an energy savings company (ESCO) identifies and implements energy and water savings projects with a guaranteed annual utility savings that covers the cost of the projects.

In early 2020, the EWMT began working with the Virginia Department of Mines, Minerals, and Energy (DMME) - the state agency that assists public entities in going through the ESPC process. The first stage consists of providing a request for proposal (RFP) and soliciting a back-of-envelope audit from pre-qualified ESCOs. Due to precautions taken in response to COVID-19, this process was placed on hold in 2020 but was resumed in early 2021.

Strategies Planned and 2021 Outlook

Going into 2021, planned projects for replacing/upgrading equipment will continue to move forward, and a longer term ESPC to potentially expedite upgrading equipment will be kicking off as well. In February 2021, the City began the first stage (the back-of-envelope audits RFP) to evaluate potential ESCOs to partner with in implementing an ESPC. Jackson-Via Elementary was one of the three City facilities included in these back-of-envelope audits that will help ESCOs develop proposals. Details regarding the scope of the ESPC will continue to be developed in 2021, but these efforts will hopefully allow much needed upgrades that will improve the energy and water efficiency of facilities to be implemented on a large scale and at a faster pace than through the current Capital Improvement Project (CIP) process. Schools still make up the largest energy footprint in the City's portfolio of facilities and implementing larger scale approaches to improving efficiency will be necessary to achieve the City's greenhouse gas reduction goals.

Expanding the amount of energy derived from renewable sources will be a key strategy for the municipal sector portion of the City's Climate Action Plan which is currently under development. Solar has been identified in current planning discussions as the primary technology being considered, and multiple avenues for adding more capacity are being reviewed. These include power purchase agreements (PPAs) to install solar energy systems onsite at facilities and accessing offsite solar through virtual power purchase agreements (VPPAs). Solar systems installed at school locations provide the opportunity for a more tangible learning experience about renewable energy. Onsite solar power systems reduce the need for grid-purchased electricity, but system size and generation potential are limited by roof and ground space. Offsite solar provides the opportunity to access higher capacity systems that will produce larger amounts of solar energy. Although these systems would not tie directly

to school facilities, the City can retain the environmental and carbon-free attributes from the power generated, thereby reducing its greenhouse gas emissions. The City is evaluating how best to achieve the largest greenhouse gas reductions while achieving the direct benefits of onsite solar. Currently, the City is reviewing the solar potential of school roofs and comparing to roof replacement schedules so that any onsite systems are timed appropriately with roof replacements.

People (Behavior)

The people that use and interact with a facility can have a significant impact on that facility's performance. The EWMP works to support users of all ages and empower them to contribute to the efficient performance of the facility. A primary strategy the EWMP utilizes to connect with the people that use school facilities is through education and developing better awareness around how the facility works.

Strategies Implemented

Energy and Water Management 2020 Education Campaigns

Image 2: *EWMP Spring 2020 poster focusing on reducing energy and water waste.*

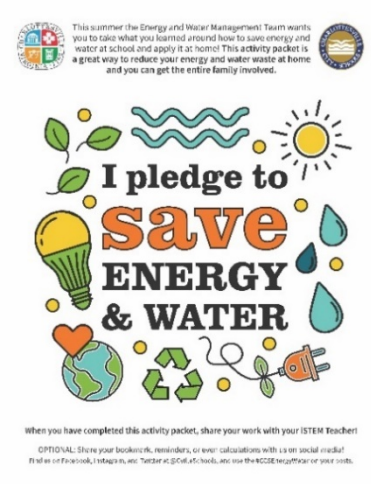
The EWMT continued the momentum generated from 2019 to engage staff and students around the importance of energy and water efficiency in their buildings. Quarterly meetings with each school's principals continued at which their school's performance and upcoming educational initiatives were discussed. Due to COVID-19 starting in Spring 2020, these quarterly check-ins were pivoted to email updates with the option for remote meetings if principals had follow-up questions. The EWMT continued publishing quarterly educational messages and materials to staff and students with some type of educational material, an announcement message, and reinforcing outreach through social media.

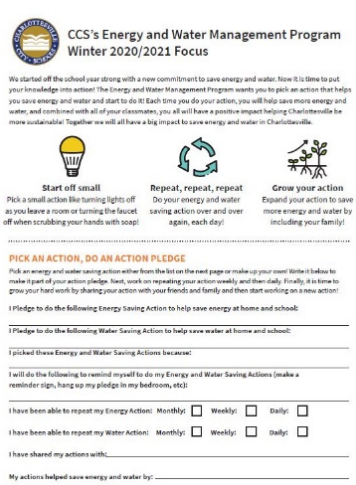
The end of the 2019/2020 academic year was tumultuous due to COVID-19, but the EWMT still issued a planned spring poster encouraging students to reduce energy and water waste (Image 2). Because a lot of the students did not get to see these in school for most of the spring, principals were encouraged to include this messaging in announcements to their students as best as possible. During the summer and at the peak of lockdowns during COVID-19, the EWMT used this opportunity to develop a more involved, multiple-page activity sheet for students with a good review of all the tips and actions they learned over the school year (Image 3). These activity sheets were made available in paper copies at all lower schools and at Charlottesville High School for summer lunch pick-ups.

The overall message of the 2020/2021 academic year was to "Commit to Water and Energy Saving Actions". With this being the second year the EWMP-delivered outreach messages to students, the program wanted to build on what students learned last academic year to start bringing action to this information regardless if they are at school or at home. For the majority of 2020, activity sheets were used to continue engagement with students while they were remote (Image 4 & 5). These were pushed out by CCS's iSTEM staff on asynchronous Friday learning days when there was more flexibility for curriculum activities. Materials were also distributed to each school's principal including

announcements, activity sheet materials, and social media images to support additional outreach within their respective schools.

To ensure messaging and engagement reached students while they were not in school buildings, education materials and messages were also supported through other outreach means including social media, newsletters, websites, and utility billing insert. Social media was utilized by both CCS and City accounts by posting each quarter's message, tips, and highlighting aspects of the activity sheets or actions students were asked to do (Images 6 & 7). In addition, EWMT sent out two utility billing inserts, which go out to all City of Charlottesville water and gas utility customers, during the summer and fall of 2020 directing families to check out that quarter's activity sheet and energy and water saving tips (Images 8 & 9). With an increased reliance on digital and remote learning, CCS and the City both made sure messaging and materials were well featured on their respective websites and highlighted in CCS digital newsletters (CCS Energy and Water Conservation Website Link and City's EWMP Education and Outreach Website Link).





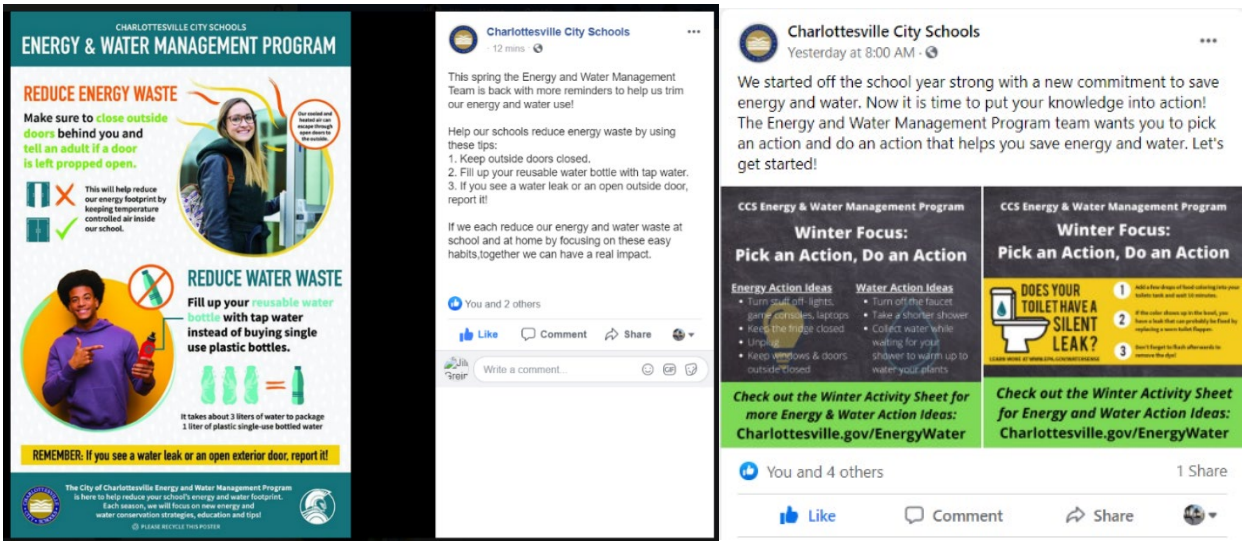
Images 3 - 5: *EWMP quarterly themed activity sheets for Summer, Fall, and Winter 2020 respectively.*

2020 CCS Educational Theme, Deliverable, and Tips:

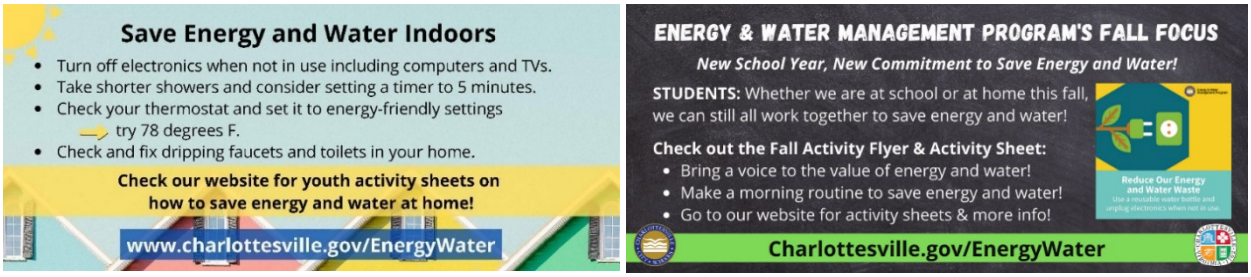
- **Spring 2020: Reduce our Energy and Water Waste**
  - Poster that included information on how to reduce unnecessary energy and water use at school and what to do if you see something that might be causing this (Image 2).
  - Tips: Reduce your energy and water waste by keeping outside doors closed, using and filling a reusable water bottle with tap water instead of simple-use plastic, and to report a water leak or propped-open outside door.
- **Summer 2020: Keep Going- Summertime Savings!**
  - Multiple page activity sheet that included information on how to take what staff and students learned at school and apply these tips at home (Image 3).
  - Tips: Review of all the tips discussed over the school year and what that means at home.
- **Fall 2020: New School Year, New Commitment to Save Energy and Water!**

- Activity sheet that asked students to bring their voice to the value of energy and water through something like a song, poem, or drawing and to come up with a new morning routine that involves energy and water saving steps (Image 4).
- Tips: Only use what you need, if you see something, say something, and reduce our energy and water waste.

- **Winter 2020: Pick an Action, Do an Action!**
  - Activity sheet that asked students to pledge to do an energy and water saving action at home and school and how to make that action stick (Image 5).
  - Tips: Start off small with your action; repeat, repeat, repeat your action; and grow your action.



Images 6 & 7: *Example social media posts from CCS promoting EWMP's quarterly messages, activity sheets, and tips.*



Images 8 & 9: *City of Charlottesville utility billing inserts there were sent out to all City of Charlottesville Utility customers in the summer and fall of 2020 (respectively) promoting the EWMP's messaging to save energy and water and activity sheets.*

Employee Outreach

Outreach focused on CCS staff occurred during the winter months with direct messaging about eliminating the use of space heaters in schools. This was paired with information about hot and cold room issues and reminders on how to use the work order process to notify Facilities Maintenance staff

to help identify the problem rather than try and mask it with a space heater, ultimately causing more heating and cooling issues for the space.

Better Business Challenge

CCS participated in the 2020 Better Business Challenge hosted by the Community Climate Collaborative (Image 10). The challenge encouraged the entire Charlottesville area to improve the performance of their buildings through monitoring, making improvements, and changing behaviors with a list of actions to work on. The EWMT helped manage CCS's participation in the challenge which ran through the Spring of 2021. Many of the program initiatives of the EWMP align with the actions of the Better Business Challenge, so the EWMT used the challenge to further encourage changes and involvement to improve CCS's energy and water efficiency.

Image 10: *City of Charlottesville's EWMT accepting their Better Business Challenge participation for 2020/2021 for the City and CCS.*

Case Study: Green BACON

In the Fall of 2020, the Charlottesville High School's Green BACON (Best All-around Club of Nerds) Club reached out to the EWMT inquiring about the Energy and Water Management Program and opportunities to engage. The EWMT presented remotely to the Green BACON Club about the EWMP and the role they play with CCS. The groups discussed ways to support each other and ways to increase awareness and engagement around EWMP education and messaging. The EWMT continues to engage with Green BACON when each quarter's educational materials are presented and hopes to do more direct engagement when students are back in the classroom.

Strategies Planned and 2021 Outlook

The EWMT plans to continue education and outreach efforts at school through quarterly educational messaging and materials. With COVID-19 continuing to impact the world and school in 2021, activity sheets will be the primary materials developed to further the EWMP messages. The remaining themes, assignments, and tips for the 2020/2021 academic school year are outlined below. Depending on COVID-19 and school structure in the 2021/2022 academic year, the EWMT hopes to re-engage students around improving energy and water performance in their schools. This includes supporting more hands-on learning opportunities for students; the EWMP is providing Climate Action Activity Kits to all 5th grade students with the help of the Community Climate Collaborate and Virginia Discovery Museum in the Spring 2021.

2021 CCS Educational Theme, Deliverable, and Tips

- **Spring 2021: Make Your Action Be Your New Normal!**

  - Activity sheet to make sure your new energy and water saving action stick by making reminders, making a schedule to remember the actions, and make it easy by helping to make the energy and water saving action be the obvious choice.
- **Summer 2021: Share and Inspire Others to Save.**
  - Activity sheet that will ask students to share what they have learned with family and friends and ask others to join them. There will be an optional activity to share their call to action on social media to increase awareness and engagement.

Performance

The EWMP actively monitors the performance of CCS's facilities looking for trends, abnormalities, and successes when it comes to energy and water performance. Performance data is often matched to actions outlined above such as changes in building operations, technology, and occupant behaviors. In addition, weather can have a significant impact to a building's performance; therefore, data is normalized to accommodate variations in temperature from year to year. The year 2016 is used as the City's weather normalization standard (all energy data is adjusted according to deviation from 2016 heating and cooling degree days) as it represents a typical and expected weather trend for Charlottesville, Virginia. In addition, the year 2015 was used as a performance baseline for utility tracking as it is the earliest full year of utility usage that includes all the current facilities in use by the City.

The EWMP currently has a general goal of a 2% reduction in utility consumption each year and uses this goal as a point of comparison for each school's performance to continue to encourage overall reductions in utility consumption and costs. COVID-19 posed a unique challenge for monitoring CCS's facilities as building occupancy and operations dropped drastically when lockdowns were implemented in the spring of 2020 and continued for the rest of the year. The impacts and changes resulting from energy and water efficiency improvements will be hard to separate from these significant changes in operations. The EWMT presents the performance metrics of CCS facilities below; however, reductions in usage and costs are largely the result of reduction in operations and decrease in occupancy in these facilities due to COVID-19. The EWMT continues to track the impacts of COVID-19 and to research how best to handle such a unique year in CCS's portfolio performance.

The figures and data from this report can be viewed through an interactive dashboard on EnergyCAP. See the appendix for further instructions regarding how to access this information (Appendix 3).

EUI and Energy STAR Scores

To measure performance, each school is compared to itself over time to see how energy and water usage has changed. For energy, schools are compared to each other using metrics known as Energy Use Intensity (EUI) and ENERGY STAR scores. The EUI is a measure of how much energy (electricity and natural gas) a school uses per square foot and the lower the EUI, the better. The ENERGY STAR score is on a scale from 1-100 and is a benchmark of how efficient a building is operating compared to similar buildings across the nation. For example, schools are compared to other schools in the United States, and the higher the ENERGY STAR score received, the more efficient the building is considered. An ENERGY STAR score of 50 means that the school is performing at the 50th percentile of schools nationwide while a score of 75 means that the school is performing in the top 25%. Buildings need to have a score of 75 or higher before pursuing ENERGY STAR certification. It is important to note that ENERGY STAR for buildings is a measure of operational performance at that point in time and is meant to be reviewed and applied for annually. Although there is a cost for the review and certification, achieving consistent multi-year certifications is seen as a goal for many organizations.

Based on data from the Energy Information Administration (CBECS 2012), the average EUI for education facilities in our region is 62.6 kBtu/sq.ft., and the average across the CCS portfolio in 2020 was 48.9

kBtu/sq.ft. (65.3 kBtu/sq.ft. in 2019) (Table1). The average ENERGY STAR score across the CCS portfolio in 2020 was 67 (54 in 2019) (Table 1). The reduction in the EUI and increase in the ENERGY STAR score last year was mainly due to reduced occupancy and operations in schools due to COVID-19 response. Although there were likely improvements in efficiency that contributed to this, the EWMT attribute most of the energy reductions to the changes in operations and can expect energy usage to increase back to pre-COVID-19 levels when "normal" school operations resume. The EWMT is consulting ENERGY STAR recommendations for adjusting the attributes that generate the score for each facility to account for the reduced operations in 2020 and to help normalize the ENERGY STAR score, making the score more legitimate as a representation of operational efficiency. Although six of the schools are at or above the 75 prerequisite score to apply for ENERGY STAR certification, this should not be pursued until adjustments have been made to comply with ENERGY STAR recommendations for 2020 and the EWMT confirms that all appropriate normalization has been applied.

Table 1: *Charlottesville City School's general descriptions and portfolio performance metrics (EUI and ENERGY STAR score) comparing 2020 to 2019 for all ten CCS schools. Venable Elementary School Annex is separated from Venable Elementary School metrics as its use is very different to a school.*

Schools	Year Built	Gross Floor Area (sq. ft.)	2019 Energy Use Intensity (kBtu/sq.ft.)	2020 Energy Use Intensity (kBtu/sq.ft.)	2019 ENERGY STAR Score (1-100)	2020 ENERGY STAR Score (1-100)
Buford Middle School	1965	110,650	51.3	36.9	44	67
Burnley-Moran Elementary School	1955	51,158	54.2	42.7	64	76
Charlottesville High School	1974	285,700	55.6	42.8	58	75
Clark Elementary School	1930	54,021	63.4	46.1	41	65
Greenbrier Elementary School	1930/59	46,750	56.8	43.8	60	76
Jackson-Via Elementary School	1951	66,600	52.9	37.1	56	79
Johnson Elementary School	1955	54,655	52.5	38.1	65	86
Lugo-McGinness Academy	2014	6,830	42.6	32.3	89	97
Venable Elementary School	1925/51	61,720	53.1	42.1	55	69
Venable Elementary School Annex	1925/51	1,200	180.1	127.8	3	10
Walker Upper Elementary School	1965	106,700	55.8	48.7	34	42

Portfolio Performance

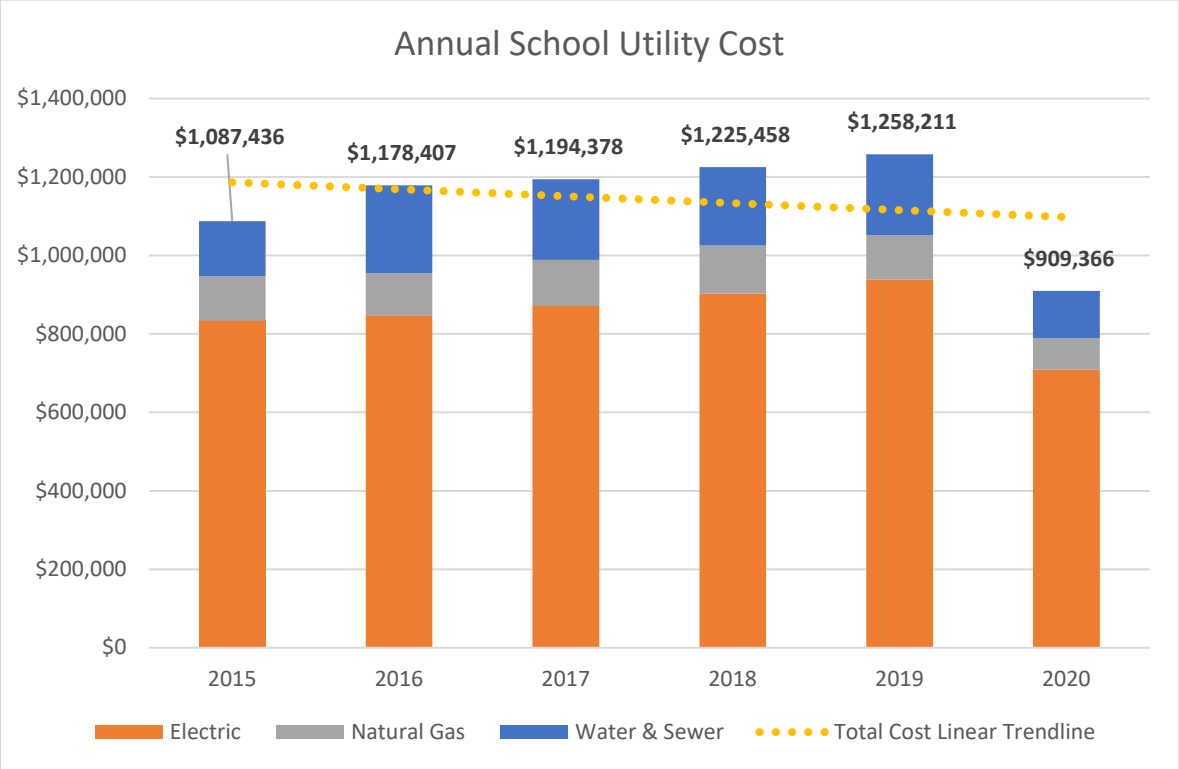


Figure 1: *Charlottesville City School's utility spending for the past 6 years for each commodity type across all school facilities. The yellow dotted line is the overall trend in spending over time across all 6 years. Total spending for each year is noted in bold text above each bar.*

In 2020, the school portfolio spent just over $900,000 on energy and water utilities, which was well below a typical year where CCS spends closer to $1.2 million annually (Figure 1). Even with utility rates increasing, this significant decline in cost can be associated with COVID-19 causing all CCS facilities to be shut down for a portion of 2020 and then run at reduced occupancy. CCS saw a 19% decline in electricity usage, a 9% decline in natural gas usage, and a 36% decline in water usage compared to the portfolio baseline 2015. The test of this decline will come after COVID-19's impact to utility usage subsides as CCS was on a slight positive trend of increasing utility costs until 2020.

In 2020, CCS spent over 77% of utility costs on electricity, which is a similar breakdown to previous years (Figure 1 and 2). In addition, the majority (approximately 66%) of the utility savings came from electric costs with an estimated $230,361 saved when comparing 2020 to 2019 electricity costs (Figure 3). Water and sewer also saw a large decline in costs and contributed 25% of total savings and estimated just over $87,000 saved from utility costs when comparing 2020 to 2019 utility costs. The largest total utility savings occurred during April and May of 2020, when facilities were almost completely shut down as a result of COVID-19 (Figure 4). As CCS facilities were opened back up in reduced capacity, estimated savings declined; however, with operations significantly reduced, each month still saw significant estimated savings when compared to 2019 utility costs.

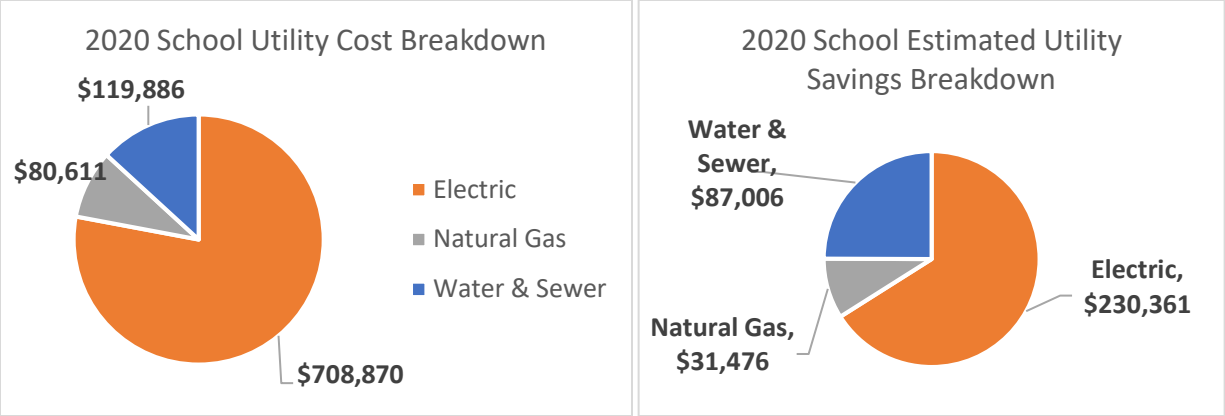


Figure 2: *Charlottesville City School's annual utility spending broken down by commodity type for 2020 across all school facilities.*

Figure 3: *Estimated 2020 utility savings for all school buildings broken out by commodity due to measures taken during COVID-19 where monthly 2020 utility cost was compared to 2019 utility cost.*

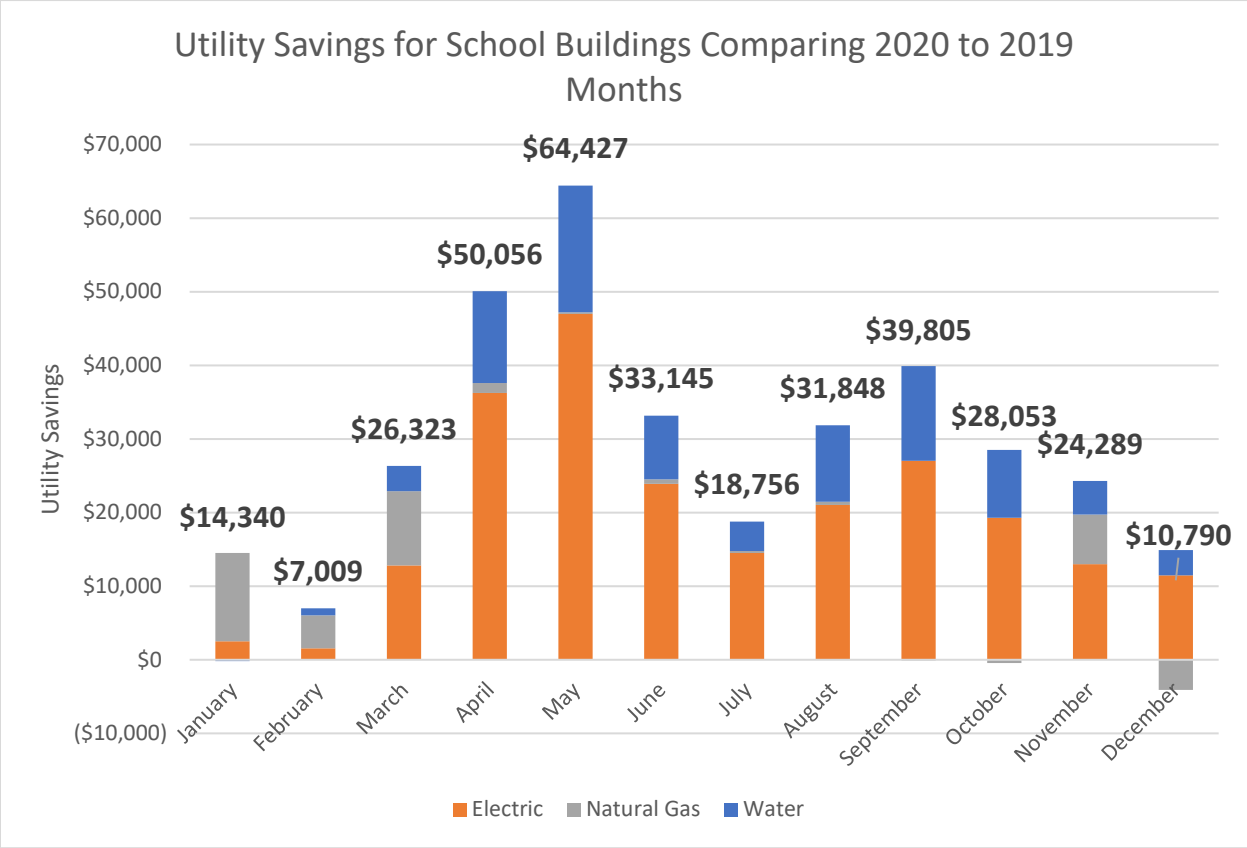


Figure 4: *Estimated utility savings by month for school buildings due to measures taken during COVID-19 where monthly 2020 utility cost was compared to 2019 utility cost. Total monthly savings are indicated in bold text above each month's bar.*

Electricity

In 2020, electricity usage dropped by 23.3% from 2019, with the school portfolio using 7,264,136 kWh (Figure 5, Appendix 4). This translated to a 24.5% drop in electricity costs from 2019. The majority of the electricity reductions were seen when schools were shut down in April and May (Figure 4). As schools began to have some operations restored in July with some staff returning, HVAC equipment operation ramped up causing electricity usage from cooling the facilities to increase. This reduced the estimated electricity savings that the schools were seeing. Then in August and September, there is typically a rise in electricity usage from schools getting back in session, but since this did not occur fully this year, there was an increased electricity savings during that time from reduced plug load and reduced space cooling (due in part to more unoccupied space and less body heat). Towards the end of the year, electricity usage begins to taper off as the cooling season (where air conditioning is needed) was ending. This happens every year, so a drop-in savings compared to 2019 was expected.

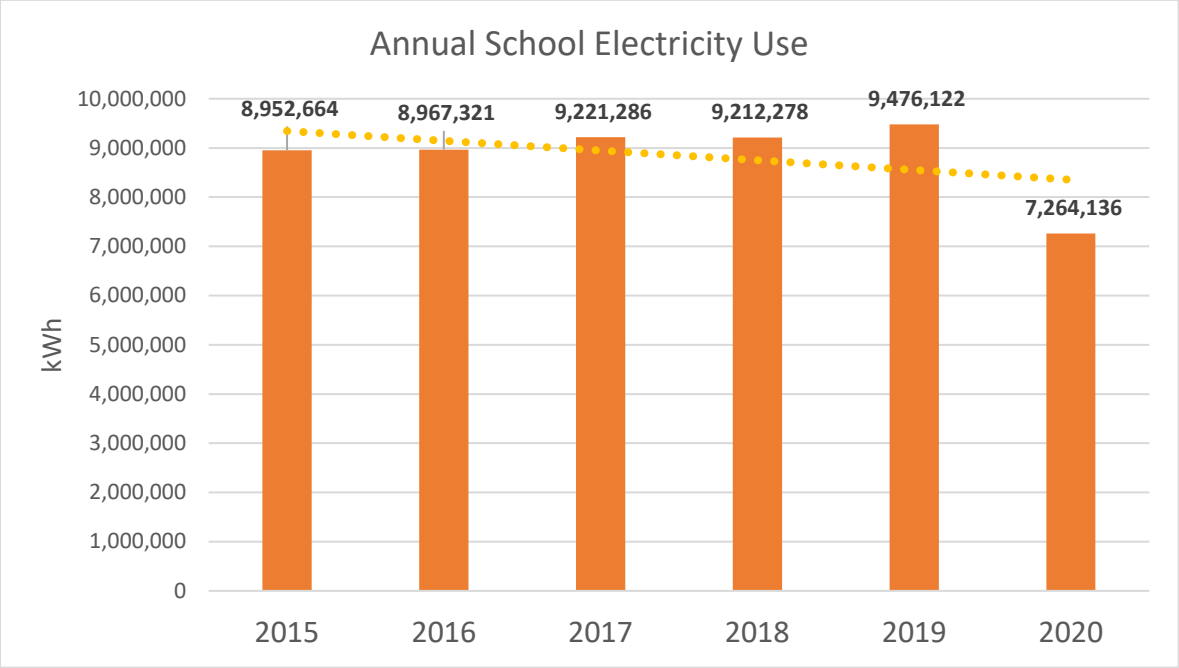


Figure 5: *Charlottesville City School's annual electricity usage for the past 6 years across all school facilities. The yellow dotted line is the overall trend in usage over time across all 6 years. Total usage for each year is noted in bold text above each bar.*

Every school saw at least a 13% drop in electricity usage compared to 2019. Lugo-McGinness Academy saw the largest drop with a 40.4% decline, followed by Johnson Elementary (35.3%) and Jackson-Via Elementary (30.6%) (Appendix 4). Nearly every school experienced a spike in electricity usage back to normal levels or above in July when staff returned and there was a need to condition schools back to comfortable levels for occupancy.

The portfolio had seen a slight increase in electricity usage in 2019 compared to 2018 and electricity levels could rise back to 2019 levels once returning to normal operations. This increase is expected to

occur but will hopefully be minimized as the EWMT makes further progress on managing electricity loads in our schools.

Natural Gas

In 2020, natural gas costs represented 8.9% of total utility costs for CCS facilities, which is in line with previous years (Figure 2). The CCS portfolio saw a 12.1% decline in natural gas usage which was much less than seen with electricity or water and sewer (Figure 6 and Appendix 5). Natural gas is mostly used for space heating in facilities, and at CCS facilities, higher natural gas usage occurs in the winter and lower natural gas usage occurs in the summer. As responses to COVID-19 didn't start until the end of March and into April, the heating season was starting to end, and natural gas use was tapering off per normal seasonal conditions. Natural gas usage was on par with 2019 during the summer, as low natural gas usage is expected, and then natural gas typically begins to increase in October and November. The schools had limited occupancy during this time and space heating in particular areas were not necessary, showing a lower natural gas usage compared to 2019. However, as temperatures dropped further in December, it became apparent that more space heating was necessary to heat areas that had limited occupancy, which caused an increase over 2019 levels that month (Figure 4). Although the EMWT had noted these natural gas increases, it was difficult for Facilities Maintenance to manage comfort levels when spaces were mostly empty, so the extra space heating was required. This is an interesting scenario that was anticipated, but the EWMT is still investigating strategies to manage this with existing HVAC systems (designed for higher occupancy).

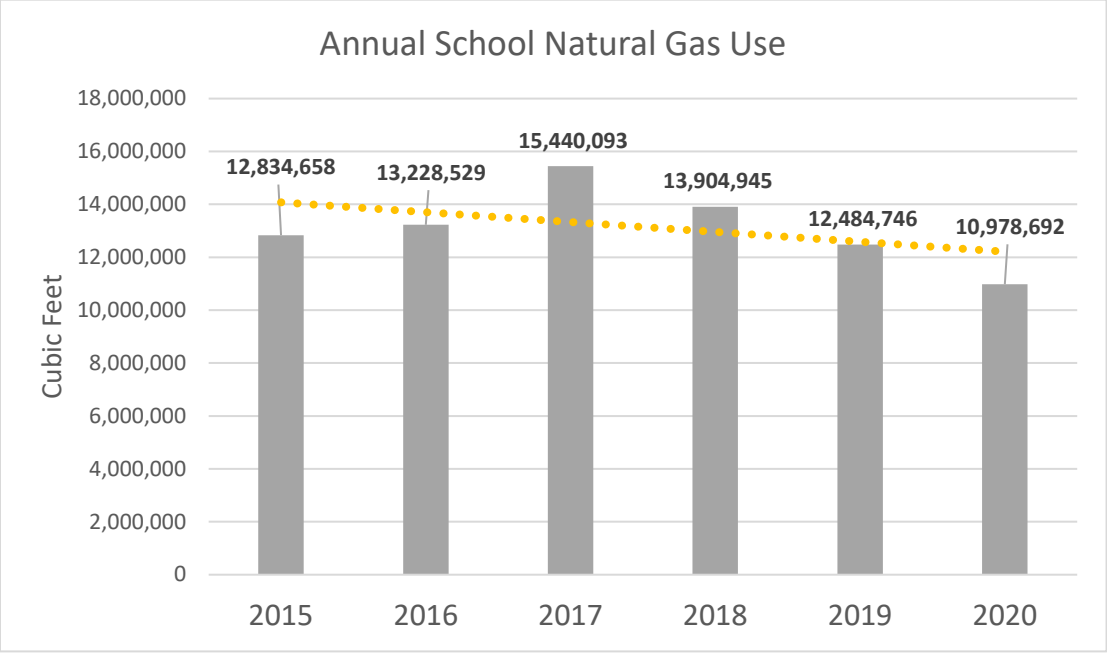


Figure 6: *Charlottesville City School's annual natural gas usage for the past 6 years across all school facilities. The yellow dotted line is the overall trend in usage over time across all 6 years. Total usage for each year is noted in bold text above each bar.*

Most schools saw a natural gas savings in usage at the end of 2020, the two highest being Jackson-Via Elementary (22.3% decline) and the Annex at Venable Elementary School (25.4% decline) (Appendix 5). However, both Walker Upper Elementary and Venable Elementary showed an increase or on par with 2019, mostly from usage seen in December 2020. Unfortunately, this increased natural gas usage is going to be seen in the winter moving into 2021. As mentioned, the EWMT is working with Facilities Maintenance to identify an effective strategy for managing space heating in low occupancy facilities that can be incorporated in the future, should a low occupancy situation occur again.

Water and Sewer

In 2020, just over 13% of total utility costs were from water and sewer at CCS facilities (Figure 2). Water and sewer costs and water use had been displaying a fluctuating but slightly positive trends until 2020 (Figure 7). Domestic daily water usage is heavily impacted by the number of people in a building particularly from the use of toilets. Outdoor water use can also have a large impact on water use at CCS facilities as several schools have fields that require irrigation during the warmer months. In 2020, these fields were not in use by the schools and outside organizations and as a result required a lot less irrigation. Therefore, the large decline in occupancy and irrigation use in 2020 due to COVID-19 were the primary drivers for the low water usage in 2020.

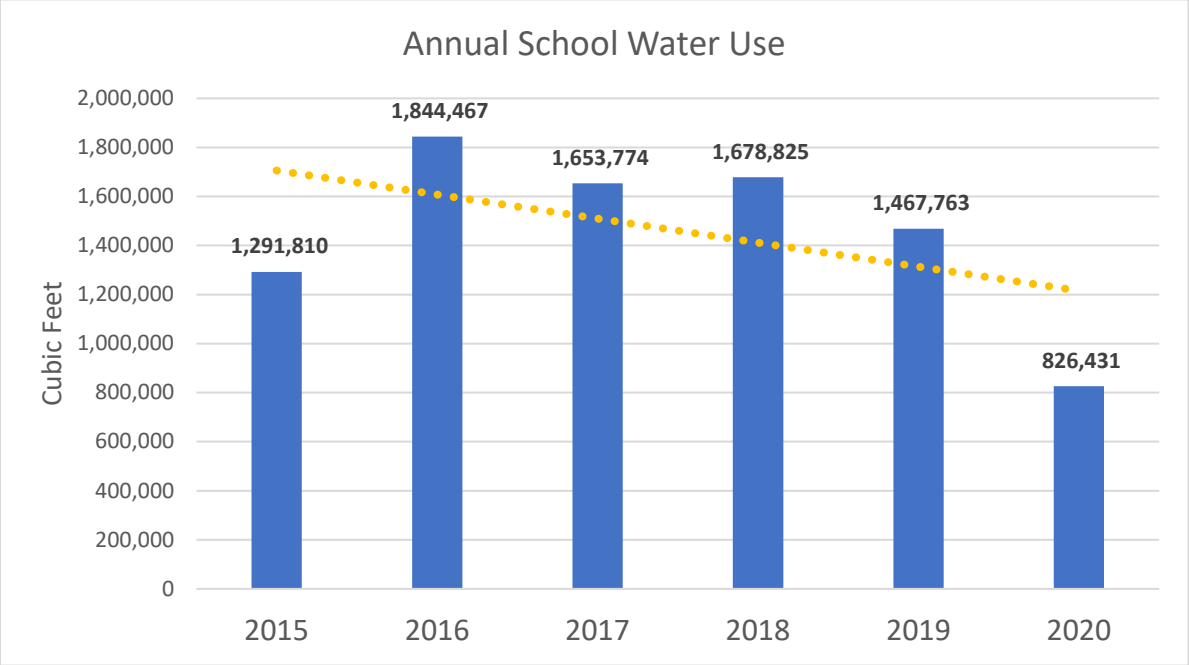


Figure 7: *Charlottesville City School's annual water usage for the past 6 years across all school facilities. The yellow dotted line is the overall trend in usage over time across all 6 years. Total usage for each year is noted in bold text above each bar.*

When comparing 2019 to 2020, there was a 43.7% decline in water usage and a 42.1% decline in water and sewer costs (Figure 1, Appendix 6). When looking across each school and comparing 2019 to 2020 water usage: all schools showed a decrease in water usage over the 2% goal averaging at a 46% decline and all schools showing over 23% decline in usage. A few schools saw very large declines in water usage

when comparing 2019 to 2020, including Lugo-McGinness Academy (83.0 % decline) and Venable Elementary School (65.4% decline) as both these schools stayed mostly vacant during COVID-19. During 2020 and while there were fewer people in these facilities, reviewing monthly utility usage was essential as there was a greater potential for water leaks to go unnoticed and unreported. Overall, there were few issues identified during monthly utility reviews to indicate a water leak or issue at the schools in 2020. There were only a few select incidents where increases in water usage warranted further investigation for a potential running toilet, dripping faucet, or other type of water issue and those identified had water usage return to COVID-19 water usage levels.

Greenhouse Gas Emissions

The CCS portfolio had seen a downward trend in greenhouse gas emissions (GHG) and then a leveling off from 2015 to 2019, but with the major reductions seen in energy usage at CCS facilities in 2020 due to COVID-19, GHG emissions saw a sharp decline (28.0%) (Figure 8). The GHG emissions identified in this report are from the electricity use and natural gas used at CCS facilities. Even though 2020 was a unique year for energy performance, the split of GHG emissions from electricity and natural gas was still the same as previous years (Figure 9).

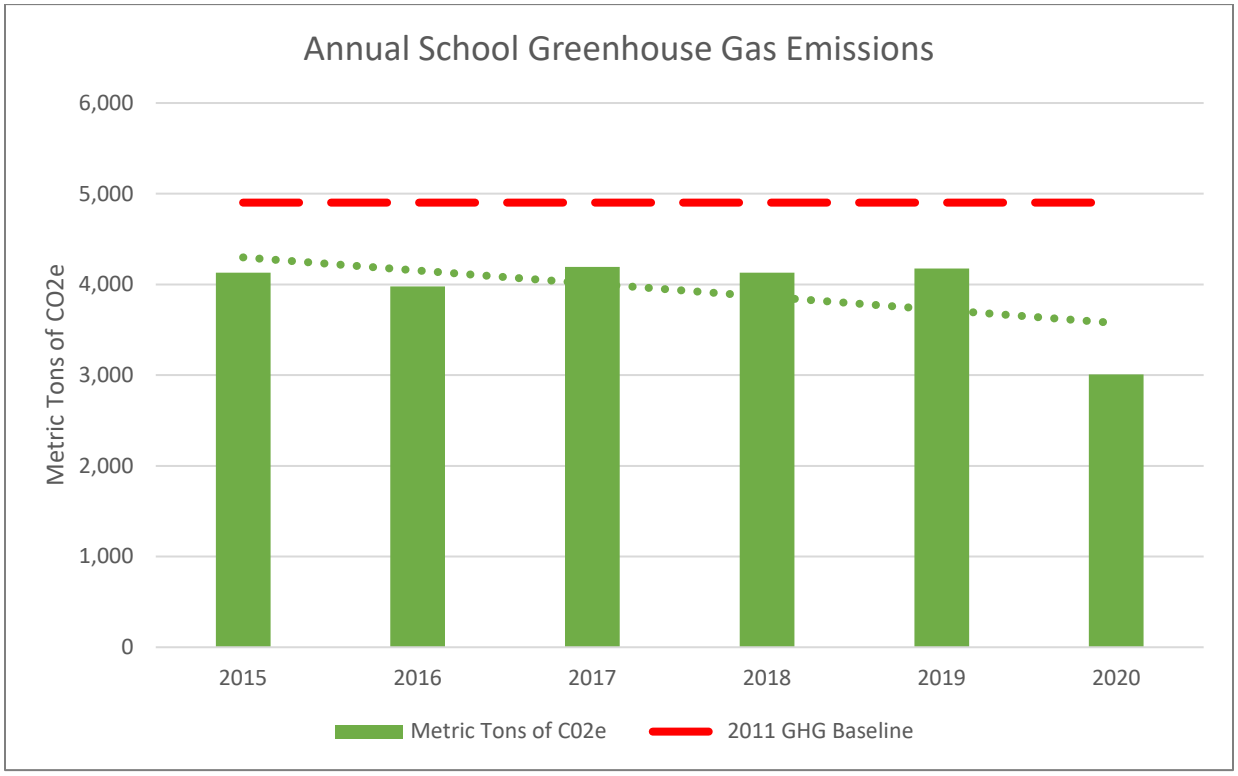


Figure 8: *Greenhouse gas emissions for the past 6 years across all school facilities. The green dotted line is the overall trend over time across all 6 years.*

Given that the large reduction in GHG emissions seen in 2020 was from responses to COVID-19 rather than actual efficiency gains, it is anticipated that annual GHG emissions will rise after "normal" operations are resumed. This means that these reductions are not true reductions as they don't depict a new set of operations to be expected in future years and therefore cannot necessarily be used to show

progress toward the City's greenhouse gas reduction goal. The treatment of the data to normalize for this anomaly year is still being determined. Although, GHG emissions from CCS facilities can be expected to return to the typical levels seen prior to 2020, all measures identified in this report to reduce energy usage will produce a corresponding reduction in GHG emissions and will go toward reaching the City's greenhouse gas reduction goals.

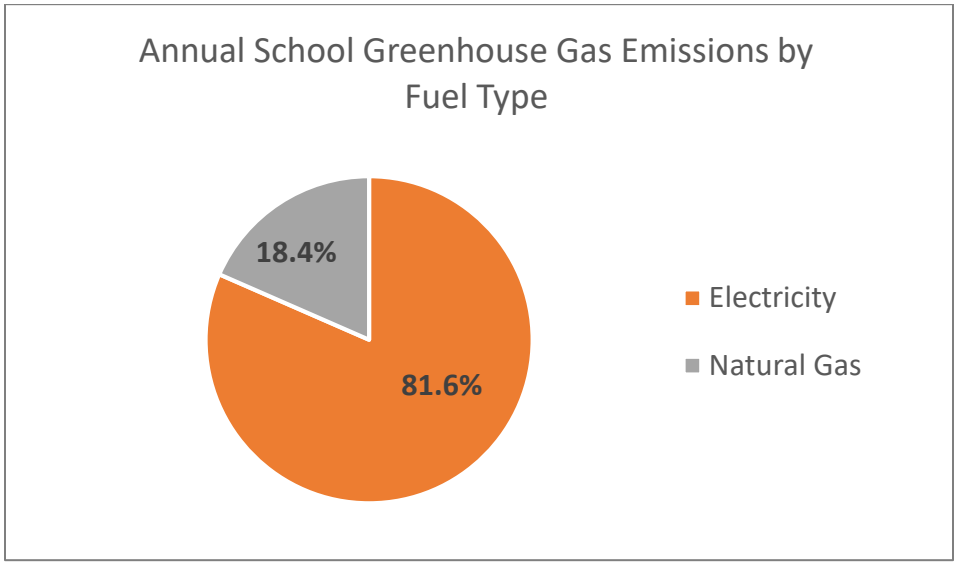


Figure 9: *Greenhouse gas emissions by fuel type (percentage) for all school facilities.*

2021 Outlook

With COVID-19's impact going through 2021, the EWMP will continue to remotely monitor and report on CCS's performance. As CCS facilities open back up to students, it is expected that some utility usage and costs will increase (higher than 2019 reported numbers) as a result of improvements made to the facilities such as enhanced filtration in HVAC systems (including UV and Bi-polar Ionization systems) along with portable HEPA filters for mitigation of COVID-19 in most facilities.

The EWMP plans to establish clear utility reduction goals for CCS's facilities that are in line with the City of Charlottesville's greenhouse gas emission reduction goals and Climate Action Plan. The EWMP will continue to review utility performance monthly and investigate opportunities to improve efficiency through operations, technology, and behavior strategies. Through an Energy Savings Performance Contract (if pursued), the program hopes to identify and tackle a myriad of opportunities to improve efficiency at most of the CCS facilities and to realize cost savings from these improvements over the life of the contract. Through some form of Power Purchase Agreement (if pursued), the program hopes to realize a shift in electricity generated from solar that are both cost-saving and emissions-reducing.

Education and outreach of CCS staff and students have allowed for considerable progress to be made on energy and water efficiency, and the EWMP is looking forward to continuing this momentum to impact behavioral changes. COVID-19 will continue to be a challenge in 2021 as building usage and occupancy continues to be variable and different than previous years. The EWMP will continue to research how to best track and normalize for utility changes from COVID-19 so that savings can be more accurately attributed to efficiency improvements from CCS's progress.

Appendix

Appendix 1: ***Resolution for Charlottesville City Schools Energy and Water Performance, signed in April 2019.***

Resolution for Charlottesville City Schools Energy and Water Performance

Whereas, Charlottesville City Schools are committed to personal and academic excellence and preparing all current and future students to be engaged citizens who make contributions to the well-being of their community, including the natural environment; and

Whereas, building energy use is a major expense and emitter of greenhouse gases contributing to air pollution and climate change; and

Whereas, actions that reduce negative climate and air quality impacts and increase energy efficiencies will also lead to a cleaner environment and a better quality of life for both students and community members; and

Whereas, renewable power installations, energy savings initiatives, and fuel-efficient transportation provide an educational opportunity for students and employees for everyday teaching and learning; and

Whereas, through practices and partnerships, Charlottesville City Schools strives for optimized energy and water efficiency while balancing equity, economic, and environmental impacts; and

Whereas, Charlottesville City Schools has been deliberate and proactive in implementing environmental improvement measures in school operations and taking actions that reduce resource consumption and associated greenhouse gas emissions, including:

- Implementation of a Guaranteed Energy Savings Performance Contract in 2007 to provide energy efficiency and infrastructure upgrades to three schools
- Certification by U.S. Environmental Protection Agency as ENERGY STAR® for seven of nine schools in 2009
- Installation of solar photovoltaic systems on Charlottesville High School and Lugo-McGinness Academy
- Honored by U.S. Department of Education in 2016 with Green Ribbon Schools District Sustainability Award; and

Whereas, pursuing energy improvements and cleaner sources of energy is in line with City goals, values, and commitments on climate protection that acknowledge local and global implications; and Whereas, Charlottesville City Schools aims to reflect and support the goals of the community it serves.

Therefore be it resolved that the Charlottesville City Schools, acknowledging the ongoing partnership with the City of Charlottesville and the reliance on City support in implementing energy and water performance improvement measures, commits to

1. Support improved performance of the school building portfolio through efforts to reduce energy and water use through management, conservation, and efficiency upgrades; and
2. Work with the City to pursue new school buildings that integrate high performance standards related to energy and water; and
3. Partner with City staff to evaluate and pursue opportunities increasing the amount of clean energy used by Charlottesville City Schools, such as through increased onsite renewable energy.

Chair, Charlottesville City School Board

April 11, 2019

Date

Appendix 2: Charlottesville City School 2019 Annual Energy and Water Performance Report

Charlottesville City School 2019 Annual Energy and Water Executive Summary and Report (PDF)

Charlottesville City Schools 2019 Annual Energy and Water Performance Report

May 2020

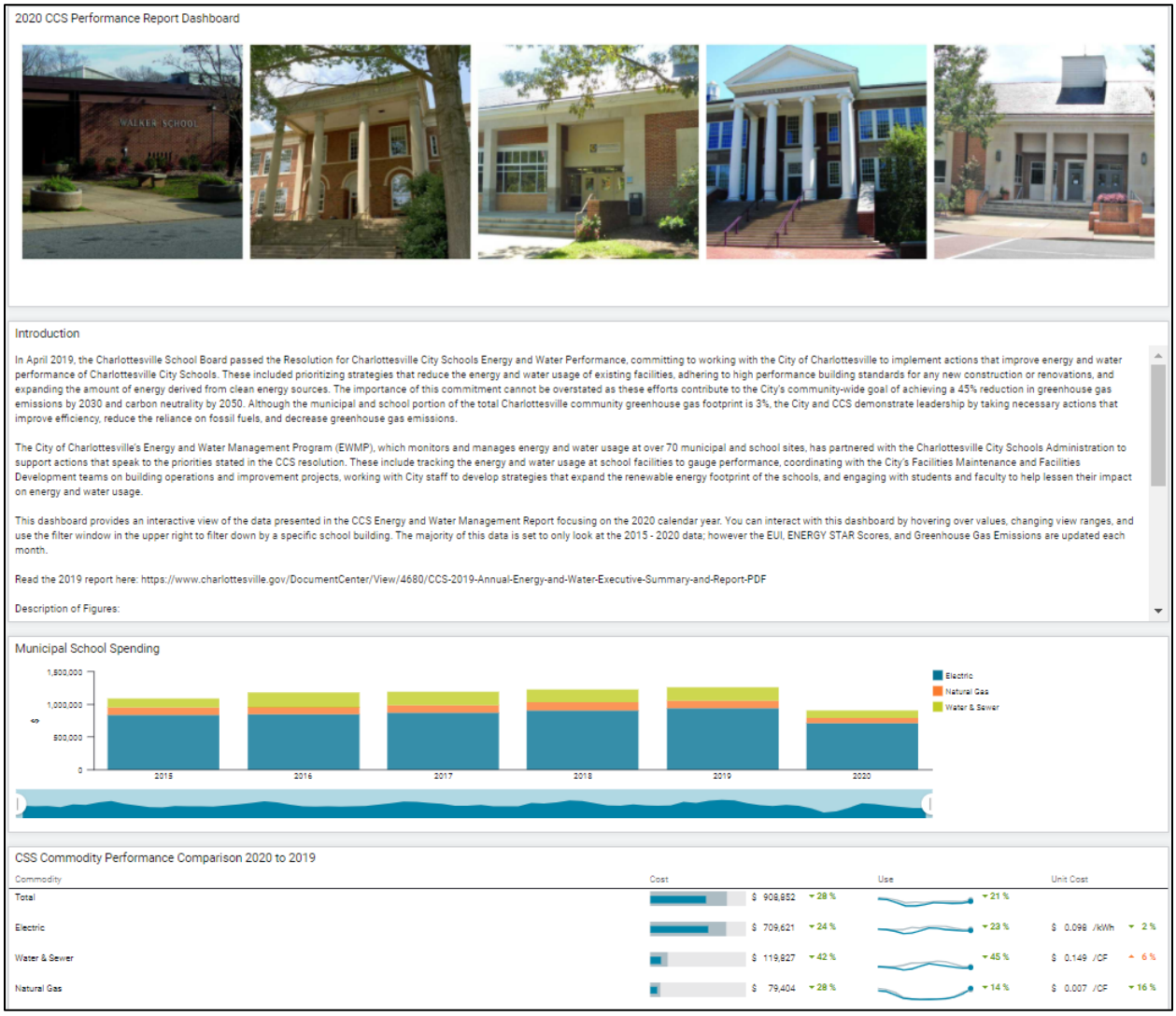
Energy & Water Management Program
City of Charlottesville

Appendix 3: EnergyCAP Dashboard Link and Instructions on how to interact with the data views

EnergyCAP 2020 CCS Performance Report Dashboard Link

This dashboard is an interactive option for viewing the data put forth in this report using the EWMT utility tracking software, EnergyCAP. The figures in this dashboard are all slight variations of the data provided in this report. The data in this dashboard are for all Charlottesville City Schools; however, you can further filter the data specific for one school using the "Filter by building or building group" feature in the upper right. Start typing the name of the school and select the correct name from the auto-generated list and the data will update with your new filtered view. Many of the figures and graphs offer the ability to interact including hovering over the figures to get detailed information and changing time views of the data using the slide bar above or below a graph. Most data presented in these figures are static and are focused on 2020; however, a few are continually updated with data over time but still include 2020 numbers.

Any questions about this data or dashboard can be directed to EnergyWaterTeam@charlottesville.gov.



Appendix 4: Charlottesville City School's electric usage and cost for each school in 2019 and 2020 with percent comparison. Usage is weather normalized.

Building Name	Electric Usage (kWh)			Electric Cost		
	2019	2020	% Change	2019	2020	% Change
Buford Middle School	1,413,878.85	1,035,762.56	-26.7%	$140,373.84	$101,048.83	-28.0%
Burnley-Moran Elementary School	509,613.80	415,335.02	-18.5%	$51,336.82	$40,693.65	-20.7%
Charlottesville High School	3,059,226.35	2,353,469.58	-23.1%	$303,142.34	$229,587.10	-24.3%
Clark Elementary School	577,712.72	405,630.53	-29.8%	$56,584.56	$39,412.42	-30.3%
Greenbrier Elementary School	493,114.91	375,866.66	-23.8%	$49,524.32	$37,536.49	-24.2%
Jackson-Via Elementary School	657,289.34	456,392.12	-30.6%	$65,158.72	$44,839.55	-31.2%
Johnson Elementary School	513,556.36	332,218.52	-35.3%	$51,817.36	$33,458.61	-35.4%
Lugo-McGinness Academy	33,996.29	20,256.16	-40.4%	$3,699.26	$2,264.88	-38.8%
Venable Elementary School	667,195.25	525,784.24	-21.2%	$65,776.51	$51,444.88	-21.8%
Venable School Annex	14,465.88	10,443.07	-27.8%	$1,589.66	$1,171.05	-26.3%
Walker Upper Elementary School	1,536,072.75	1,332,978.01	-13.2%	$150,226.84	$127,412.06	-15.2%
Total	**9,476,122.49**	**7,264,136.47**	**-23.3%**	**$939,230.24**	**$708,869.53**	**-24.5%**

Appendix 5: Charlottesville City School's natural gas usage and cost for each school in 2019 and 2020 with percent comparison. Usage is weather normalized.

Building Name	Natural Gas Usage (CF)			Natural Gas Cost		
	2019	2020	% Change	2019	2020	% Change
Buford Middle School	634,313.88	586,838.29	-7.5%	$6,022.39	$4,444.23	-26.2%
Burnley-Moran Elementary School	894,385.78	807,252.59	-9.7%	$8,002.89	$5,855.85	-26.8%
Charlottesville High School	4,865,397.29	4,096,329.46	-15.8%	$42,605.55	$30,137.03	-29.3%
Clark Elementary School	1,284,706.91	1,186,815.19	-7.6%	$11,286.16	$8,193.88	-27.4%
Greenbrier Elementary School	855,487.12	815,812.64	-4.6%	$8,108.63	$6,044.52	-25.5%
Jackson-Via Elementary School	1,154,493.19	897,418.63	-22.3%	$9,967.70	$6,548.89	-34.3%
Johnson Elementary School	1,016,161.03	865,041.89	-14.9%	$8,908.88	$6,385.90	-28.3%
Lugo-McGinness Academy	164,459.91	150,007.24	-8.8%	$1,774.78	$1,421.25	-19.9%
Venable Elementary School	851,524.93	852,382.68	0.1%	$8,244.63	$5,799.05	-29.7%
Venable School Annex	158,074.80	117,989.50	-25.4%	$1,501.82	$1,049.83	-30.1%
Walker Upper Elementary School	605,741.47	602,804.11	-0.5%	$5,663.36	$4,730.53	-16.5%
Total	**12,484,746.31**	**10,978,692.20**	**-12.1%**	**$112,086.78**	**$80,610.96**	**-28.1%**

Appendix 6: Charlottesville City School's water usage and cost (water and sewer) for each school in 2019 and 2020 with percent comparison.

Building Name	Water & Sewer Usage (CF)			Water & Sewer Cost		
	2019	2020	% Change	2019	2020	% Change
Buford Middle School	187,217.78	125,290.38	-33.1%	$25,236.88	$16,759.13	-33.6%
Burnley-Moran Elementary School	59,035.00	37,536.82	-36.4%	$9,061.36	$5,949.96	-34.3%
Charlottesville High School	525,198.18	268,389.56	-48.9%	$70,149.65	$38,105.66	-45.7%
Clark Elementary School	94,229.72	38,838.78	-58.8%	$13,950.01	$6,031.34	-56.8%
Greenbrier Elementary School	63,911.52	31,463.53	-50.8%	$10,613.29	$6,231.02	-41.3%
Jackson-Via Elementary School	106,204.55	45,339.23	-57.3%	$15,524.69	$6,937.49	-55.3%
Johnson Elementary School	72,570.17	53,703.59	-26.0%	$11,165.37	$6,994.28	-37.4%
Lugo-McGinness Academy	9,841.60	1,668.91	-83.0%	$1,778.52	$614.75	-65.4%
Venable Elementary School	100,992.98	34,921.83	-65.4%	$14,696.90	$5,751.15	-60.9%
Venable School Annex	1,171.35	873.73	-25.4%	$277.16	$242.77	-12.4%
Walker Upper Elementary School	247,389.67	188,404.70	-23.8%	$34,440.22	$26,268.13	-23.7%
Total	**1,467,762.53**	**826,431.07**	**-43.7%**	**$206,894.04**	**$119,885.70**	**-42.1%**