Wichita State University Carbon Footprint Analysis of Electricity and Natural Gas Usage

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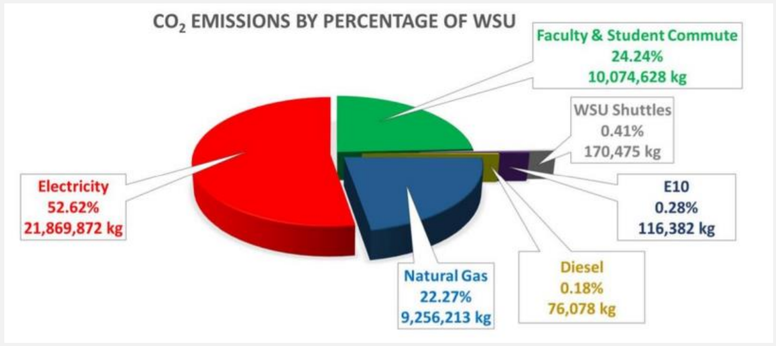
Why Study Carbon Emissions?

In the modern age, we are growing more aware of the limited time and resources this planet has and that we must take steps to prevent this. Previously in 2019, there was a study on the carbon footprint of Wichita State University. Given that a global pandemic has occurred, we have decided to reevaluate the emissions generated by the WSU campus as well as the worsening of the global climate crisis. If Wichita State is a university leader in innovation not only in Kansas but also the country, why shouldn't we also lead in the effort to combat climate change. It has been too long that we have decided that someone else will fix the problem, only you can make the difference.

What Should You Expect?

The previous study conducted on the carbon footprint of the WSU campus covered both Scope 2 and Scope 3 emissions giving an estimated total of 53,000 MT, just below half was from the electricity usage of campus. Since this first study was conducted in 2019, we expect there to be some differences in the data. These differences will be thoroughly identified in future iterations of the project. However, we know that the differences could be in relation to the expansion of campus (addition of Woolsey Hall), increased student enrollment, climate change, or any number of factors from the global pandemic of COVID-19. Below is the previous emissions profile of WSU in both Scope 2 and Scope 3.

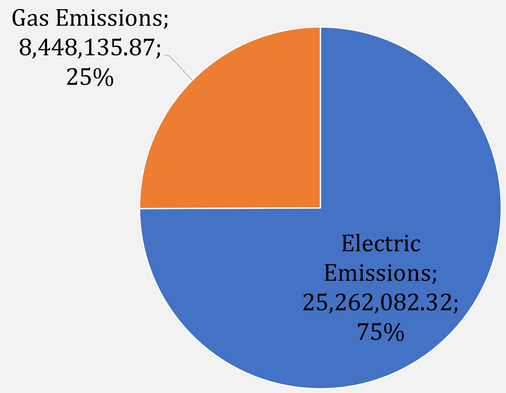


How did we reach our Conclusions?

Now, carbon emissions are broken up into "scopes of study" which include in order from one to three: direct carbon emissions through power generation, emissions through your energy provider, and then emissions of all other sources ranging from food to postage to travel. Since the university does not generate its own electricity, we will calculate the emissions of the Scope 2 category. The remaining Scope 3 emissions shall be revisited in later steps of this project that will continue over the coming years. Like the previous study, there is a commuting survey to gather the beginning of our Scope 3 emissions.

The method of study is through the analysis of electricity and gas bills provided by the Facilities team. This will be reported as megawatt per hour (MWh) and 1,000 cubic feet of natural gas (MCF) respectively. Finally, the data will be represented in kg CO2 / MWh and kg CO2 / MCF to show the effects of our activities on the atmosphere. The conversion from usage to emissions was done by using the state energy profile of Kansas, from the Energy Information Administration, to approximate the amount of CO2 for each unit of power. The access to these accounts were provided by the Facilities team.

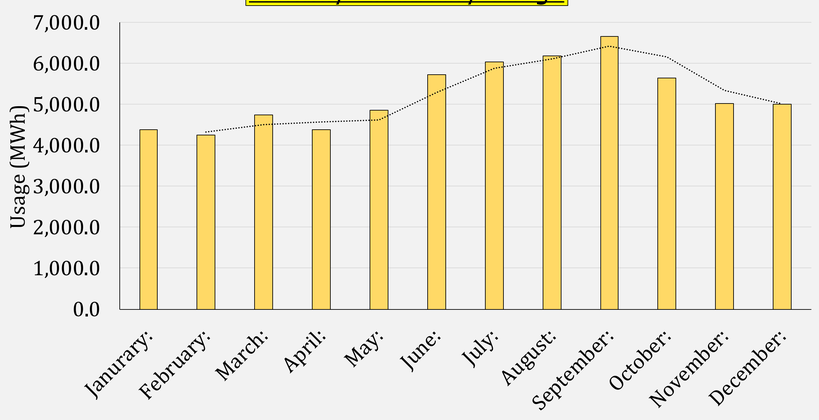
WSU Campus Emissions 2022



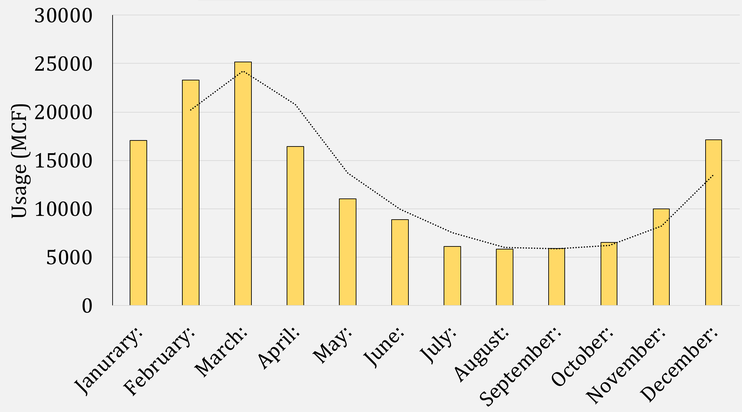
The total electrical emissions of campus was calculated to be 25,262,082.321 kg CO2 from 62,931.387 MWh of electricity. This has increased by 4 million kg CO2 since 2019. This could be due to further climate change forcing our buildings to use their HVAC systems to a more extreme extent or an increase in student enrollment. These are factors that must be analyzed further to more thoroughly work towards a solution.

Our natural gas emissions calculated to a total of 8,448,135.87 kg CO2 from 153,323.7 MCF of natural gas. This is interesting as there should be no gas heating in the residence halls, but only gas stoves.

Monthly Electricity Usage



Monthly Natural Gas Usage



What did we Learn?

With these results we determined that during the year of 2022, WSU inadvertently produced 33,710,218.191 kg CO2 from utilities usage alone. This is over half that of the previous study that included Scope 3 emissions as well as an increase in comparison. The combination of all 3 residence halls only compose about 6.45% of our electricity usage, a lower percentage than would be suspected.

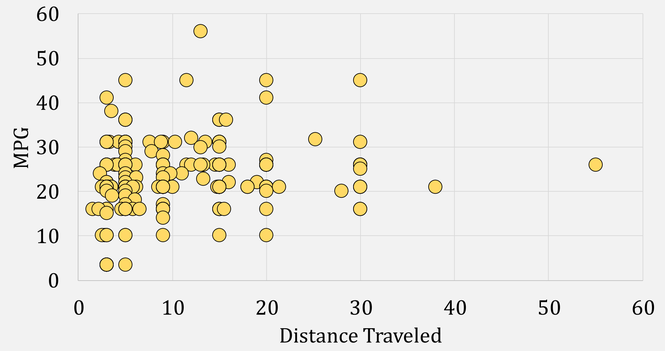
Residence Hall	Total kg CO2
Shocker Hall	814,442.037 kg
The Suites	296,696.977 kg
The Flats	520,335.079 kg
Combined	1,631,474.094 kg

What Comes Next?

- Gather data from Admissions to Geology for university related travel
- Cooperate with Dining Services to estimate the carbon footprint of our food consumption and waste
- Continually update the Scope 2 emissions as we approach a new year
- Promote climate awareness and advocate for positive change
- Conduct a study of how much additional solar panels could reduce our emissions and cost of electricity
- Conduct a commuting survey for students, staff and faculty to estimate emissions based off of those living off campus

This survey has already begun collecting data from only a few weeks of circulation! You can still fill it out in your student email. From the ~300 individuals who completed the survey, we found they had produced just over 1050 kg CO2; giving us an average of 4.51 kg CO2 per commuter. There should be far more data collected to form an accurate estimate as this value is drastically below that of the 2019 study as seen on the left. The concentrations of miles traveled and estimated miles/gallon is shown below:

Collected MPG vs. Distance Travelled



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