

Visualization and analysis of energy use and carbon cost

MSc in Big Data

Introduction

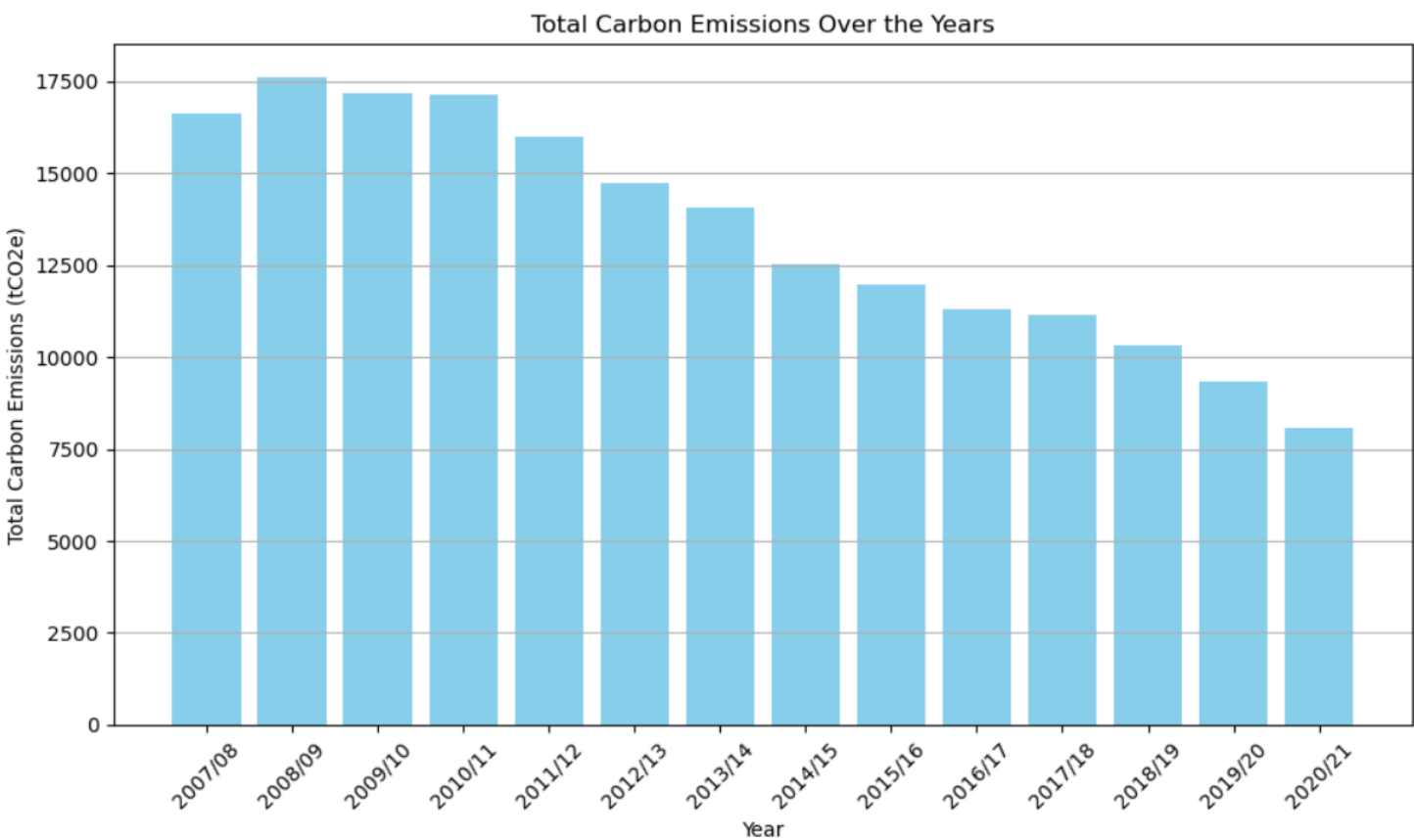
Carbon emissions, mainly a byproduct of energy usage, have imposed global enviornmental costs. This paper aims to analyze the energy usage and the associated carbon emissions data of University of Sterling to assess the ‘carbon cost’ for the institution. After initial exploratory data analysis and data wrangling our focus would be to implement forecastin to assess the carbon costs that the organization would have to bear in future, with and without the carbon cost saving projects. The goal of the research being undertaken is to highlight the impact of vast scale carbon emissions through intensive use of unsustainable energy sources to effectively formulate strategies and policies to move towards and promote evidence-based decision-making for the purpose of adopting sustainable practices.

The yearly data from 2016-2021 has been individually analyzed and visualized to report for each years’ metrics.

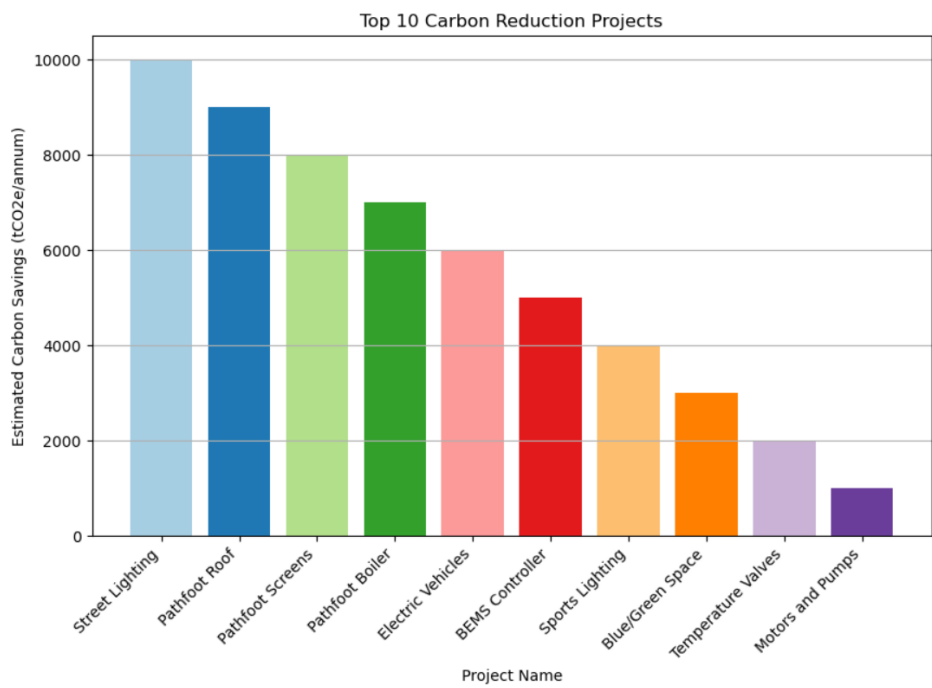
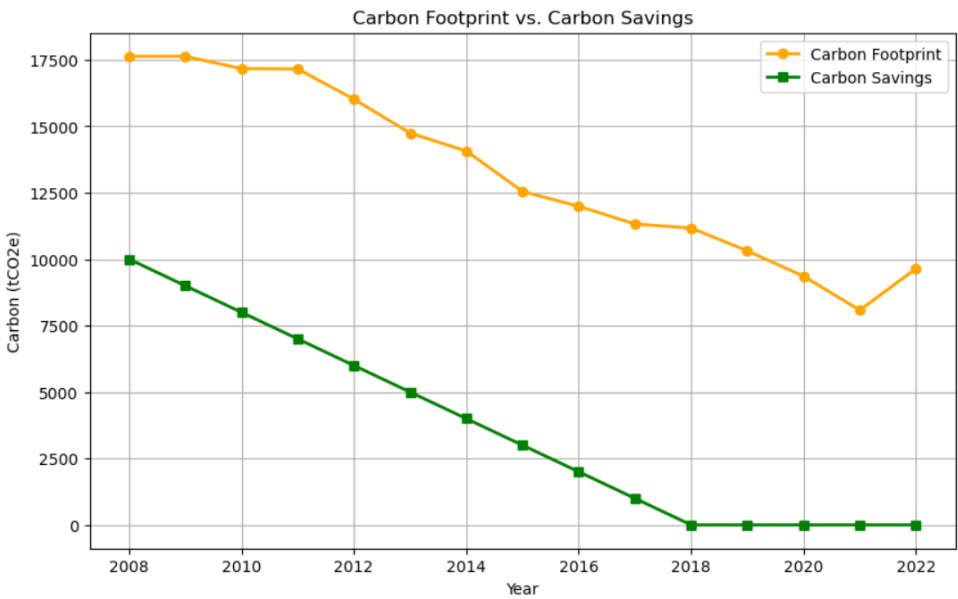
Analysis of Data

The data provided by the university includes 200+ data points to efficiently represent various entities. Each years’ data includes the university energy consumption, their total emissions, sources of these emissions along with the generation,

consumption and export of renewable energy sources implemented by the institution. Moreover, carbon emission targets have also been incorporated. By using this vast variety of data, carbon price per tonne has been calculated to assess carbon costs, also the energy efficiency has been evaluated, along with the estimated total annual carbon savings from all projects implemented by the University of Sterling.



In the figure above, we visualize the total carbon emissions which seem to have a downward trend over the years. Further, data estimations were undertaken to evaluate the carbon cost and energy efficiency of the institution.



from Motors and Pumps project.

Research Objectives

Through the analysis and visualization presented, our next steps would be to identify energy consumption patterns, assess their carbon costs along with evaluating energy efficient. We will work further with forecasting models such as ARIMA to forecast future carbon costs that the organization would bear while carbon cost saving projects consistently being implemented.

We further observe that the carbon footprint has been decreasing over the years. The sustainable projects are one reason, and their Impact has been visualized next. In this figure, we observe top 10 carbon reduction projects implemented. The Street Lighting & Path foot Roof project have resulted in the greatest carbon reduction. The least reduction resulted

