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Emissions and its driver analysis for the United Kingdom higher education institute.

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EMISSIONS AND ITS DRIVER ANALYSIS FOR THE UNITED KINGDOM HIGHER EDUCATION INSTITUTE

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ABSTRACT
UK emissions of carbon dioxide declined from around 600 million tonnes of CO2 (MtCO2) in 1990 to 367 MtCO2 in 2017, and in June 2019, the UK Government legislated an update of its greenhouse gas (GHG) emissions reduction target to attain 'net zero' by 2050. Meeting this ambitious target will require a drastic reduction in UK carbon emissions, with any remaining emissions being offset by extracting an equivalent amount from the atmosphere [1]. As a large sector of the UK economy, higher education (HEI) must contribute to the reduction in its carbon emissions if the Government's 'net zero' by 2050 target is to be met. The aim of the study is to analyze the factors driving the emissions in the UK HEI from 2014 to 2019. The study investigates the key drivers for emissions using correlation analysis, ratio analysis, and factor analysis. It also aims at determining whether the UK HEI can meet the 2020 milestone of a 43% reduction in emission with 2005 as the base year (Figure 1).

Keywords: Carbon dioxide, Emissions, Factor analysis, carbon emissions, HEI

INTRODUCTION
In the last ten years, UK Higher Education Institutions (HEIs) have increased their total income from 26 billion pounds to 80 billion pounds [2]. As one of the large sectors of the UK economy, HEIs must contribute to the reduction in its carbon emissions if the Government's 'net zero' by 2050 target is to be met. Apart from this, UK HEI's have their own milestone of reducing the CO2e emissions by 43% by 2020 from the 2005 baseline emissions [2]. For doing so, it is essential to understand what the past data indicates regarding the drivers, progress, and benchmarking. In this study, the emission data is analyzed for the UK HEI from the year 2014-15 to 2019-2020 (5 years of data). This is an aggregate study where the analysis is carried out for the overall emissions of the HEI's. The study on individual HEI is beyond the scope of this study. The data is available from the estate's management of the HEFCE [2].

METHODOLOGY
The HEI-related data was obtained from the HESA estate management web page. Correlation and regression analysis was carried out to understand the relationship between the drivers and carbon emissions. Ratio analysis was carried out on a year-on-year basis to check how it has improved or decreased and which ratio has the highest or the lowest improvement rate.

RESULTS AND DISCUSSION
The target for the individual UK HEI's is set at a 43% reduction by 2020 from the 2005 baseline year. The data analysis indicates that the aggregate emissions for the HEI have increased by 10% from 2005 to 2014-15, thereon it reduced by 39.4% in the last five years.

Figure 1 shows the distribution of the percentage change in emissions between the year 2005 (baseline) and 2018-19. The positive percentage shows the HEI has managed to reduce the emissions, whereas the negative percentage indicates that the HEI's increased the emissions. The factors which have shown consistent high correlation are total gross internal area, total staff FTE, water consumption, energy consumption. Similarly, the maximum improvement in the ratio of the emission was observed in other non-residential income (Â£), a total number of cycle spaces, total grounds area (hectares), teaching income (Â£), total site area (hectares), teaching student FTE, total staff FTE. Car and cycle space stats for the last five years shows (figure 2 & 3) that the aggregate car parking space has decreased by 5%, the aggregate cycle space increased by 15%, the aggregate emissions reduced by 39%, emission per car parking space has reduced by 28%, emissions per cycle space has reduced by 43%.

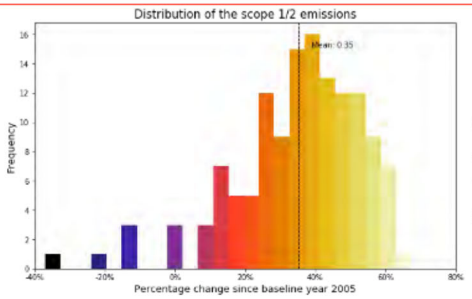

Figure 1

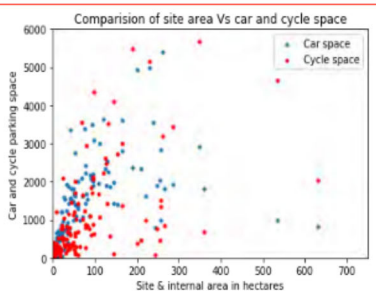

Figure 2

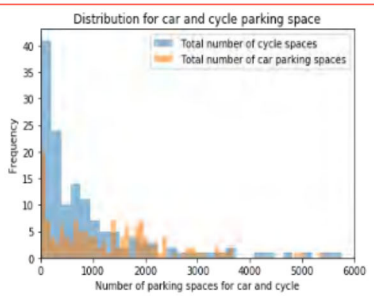

Figure 3

CONCLUSION

Among the above factors, focusing on emissions per staff FTE is more result-oriented because it also has a high correlation with the Scope 1 emissions. It appears that all the HEI's has made efforts to reduce the emissions, but they are very far away from the set benchmark. As per the present status, the HEI's have reduced 35% emissions at the aggregate level, whereas the Bright report estimated that the HEI's might achieve a 23% reduction. Only 48 HEI's have achieved the target for 43% reduction by 2020. Since 2020 is not operational for the HEI's (due to pandemic), the data till 2018-19 is considered the target year. The data indicates that the HEI's were slow to adapt to the climate change initiatives when the first awareness and regulations started in 2006-2008 [3]. It was also observed that the Scope 3 emissions reported by the HEI are the subset of the entire Scope 3 emissions which are mentioned in [4]. This is the reason why the Scope 3 emissions were found to be 0.5% of Scope 1 & 2 emissions. Few HEI's invested efforts to calculate the full Scope 3 emissions like Nottingham Trent University and Cambridge University. The result shows that the Scope 3 emission is two-third of the total emissions (Scope 1, 2, and 3 combined) [5]. HEFCE must find a way to gradually increase the Scope 3 emissions reporting from the HEI's to understand the full implications.

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