

Abstract

This study examines the role of renewable energy technologies in the UK and their effect on atmospheric CO₂ emissions, using data from the Orbiting Carbon Observatory – 2 satellite (OCO-2). Despite increased adoption of renewable technologies, atmospheric CO₂ levels continue to climb up. The study emphasizes the need for accelerated and comprehensive renewable energy adoption, alongside other measures, to limit CO₂ increases. It also highlights the interconnected nature of atmospheric issues, demonstrating that regional actions impact global CO₂ levels. Analysis of OCO-2 data offers insight into the complexities of CO₂ dispersion and contributes to increase awareness of the current climatic issues.

Objectives

- To Analyse the Deployment and Integration of Renewable Technologies in the UK
- Utilize OCO-2 Data for Quantifying Atmospheric CO₂ Levels
- Evaluate the Impact of Renewable Technologies on Atmospheric CO₂ Emissions
- Advocate for Accelerated Adoption of Renewable Technologies
- Provide Insights for Sustainable Energy Policy Development

Methodology

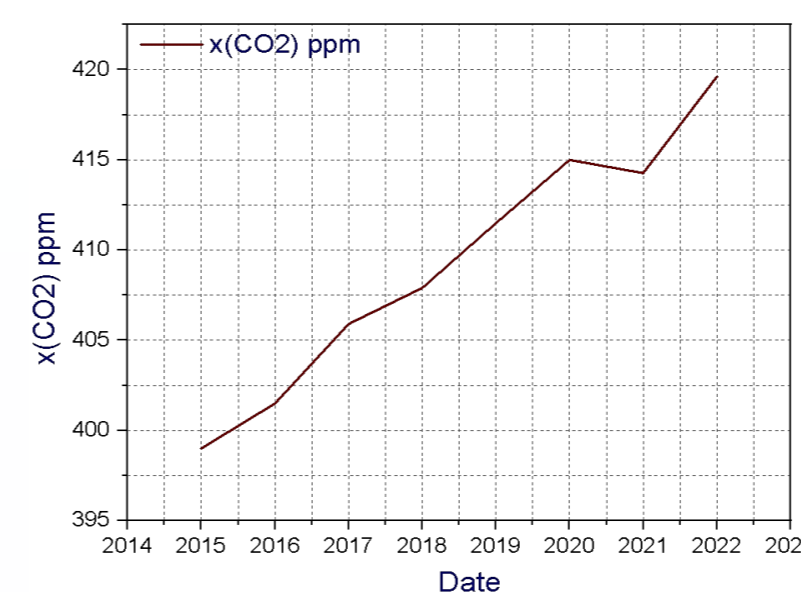
1.Literature Review: The initial phase of this study was a thorough literature review. Academic journals, policy papers, and reports from government bodies and environmental organizations have been systematically examined. The criteria for selecting these sources focussed on their relevance to the UK's renewable energy sector, including technological advancements, policy impacts, and environmental considerations. The aim was to identify trends, recognize gaps, and understand the status of renewable implementation in the UK.

2.Statistical Data Analysis: Later the study involved collecting and analysing statistical data from authoritative sources such as the UK Government, the Office for National Statistics, and leading environmental organizations. This analysis focused on data related to renewable energy production, consumption, investment, and growth trends over recent years. The approach to data analysis included both descriptive and inferential statistics to extract meaningful insights. Descriptive statistics have been used to summarize the current state of renewable technologies, while inferential statistics have helped assess relationships between different variables.

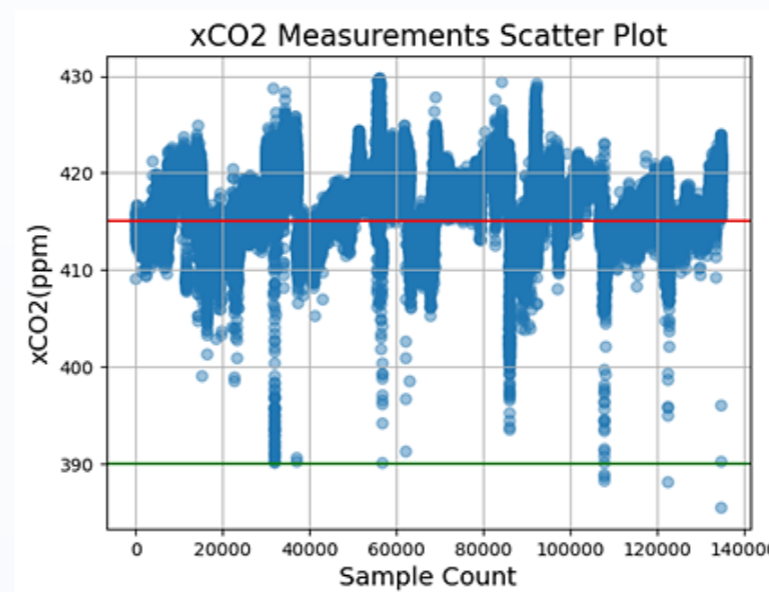
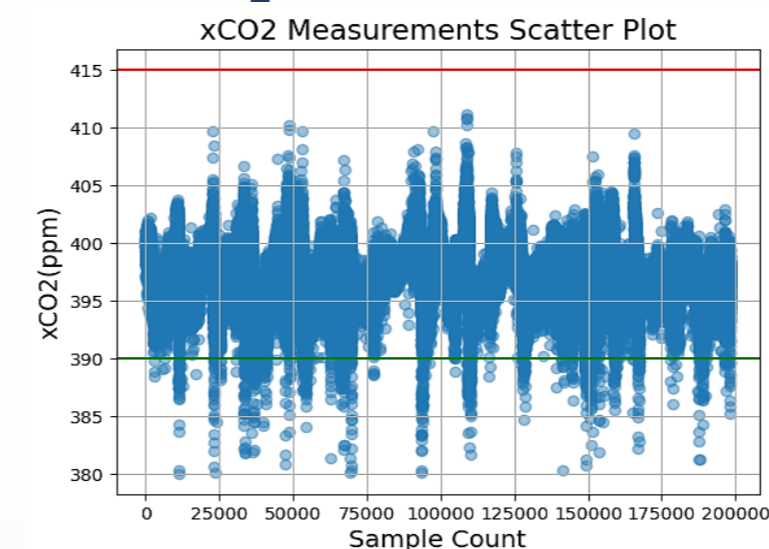
3.Data Visualization: Origin Pro Software has been used to create graphs and charts for an effective presentation of the research findings. These visualizations aim to clearly demonstrate trends, make comparisons, and highlight correlations within the data. By integrating a detailed literature review with comprehensive statistical analysis and effective data visualization, this research provides an in – depth understanding of the current and potential future state of renewable technology implementation in the UK.

Results

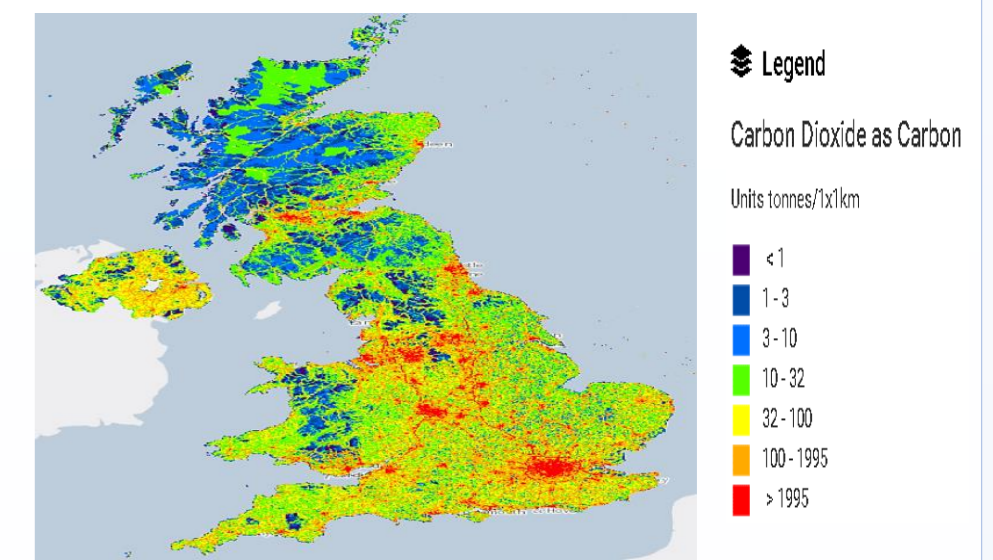
Atmospheric CO₂ levels comparison between 2015-2022



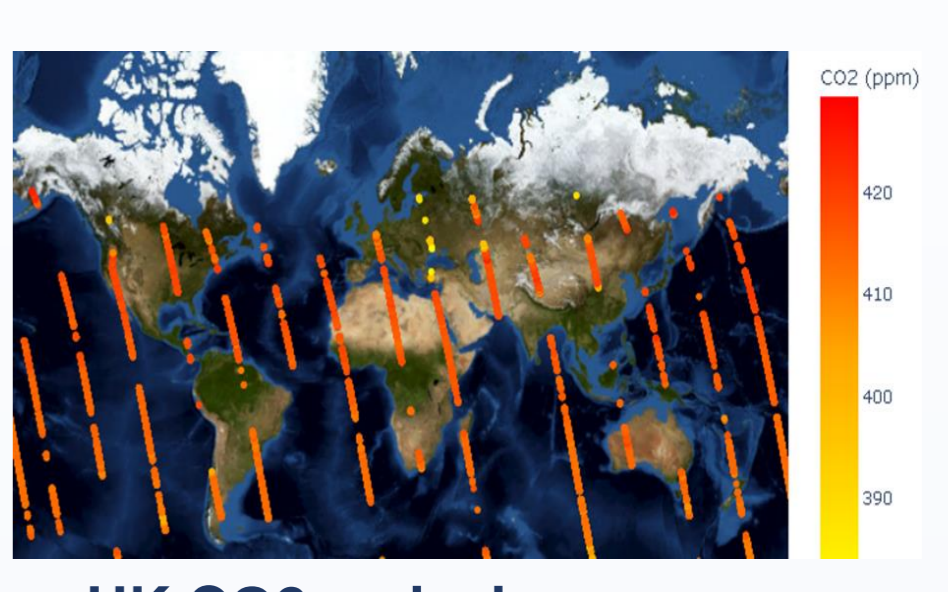
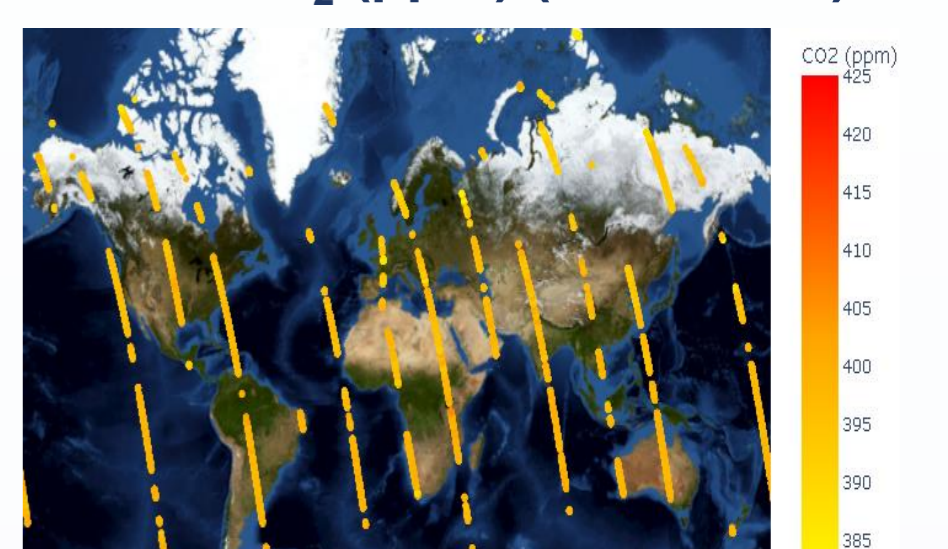
UK CO₂ (ppm) (2015-2022)



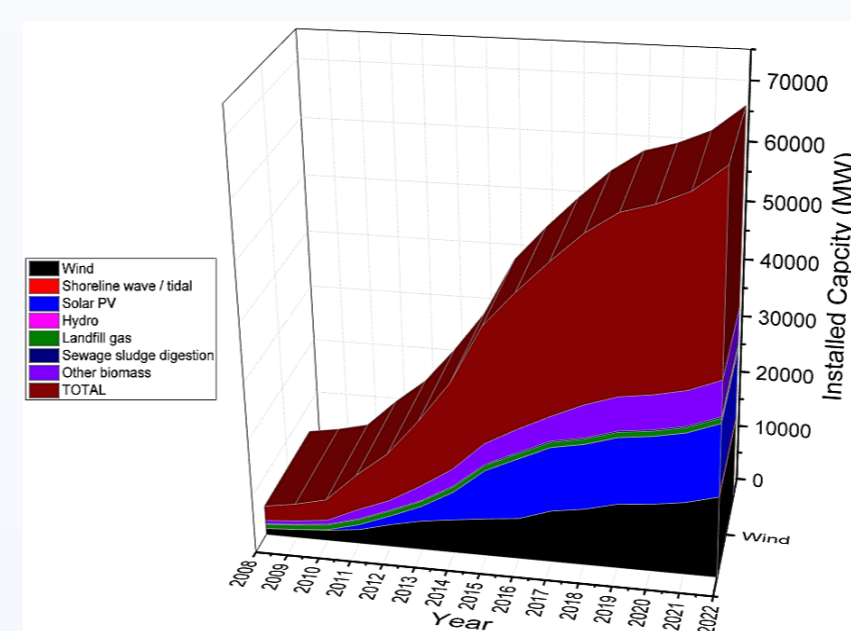
UK CO₂ emissions map (2024)



Global CO₂ (ppm) (2015-2022)



UK Renewable capacities 2008 - 2022



UK CO₂ emissions comparison 1990 - 2025



Conclusions

In recent years, the UK's adoption of renewable technologies has increased significantly, yet CO₂ emissions continue to climb. Therefore, immediate and enhanced measures are recommended to mitigate emissions effectively. Integrating energy policies, boosting investments, subsidizing green energy and increasing public engagement are essential for achieving a sustainable reduction in CO₂ levels and meeting country's environmental targets.

Acknowledgements

The authors extend heartfelt thanks to the Dragon 5 project team for their crucial support and expertise in this research. We are especially grateful to Dr. Yaxin Bi of Ulster University for enhancing our research methodology with his expert advice. We also gratefully acknowledge the financial support from the European Space Agency under the Dragon 5 project (ID. 58894). This comprehensive support has been essential to our research's progress.

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