

ABSTRACT

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Title: Application of Time Series Analysis Methods to Assess the Impact of COVID-19 on Carbon Dioxide Emission Reduction in Connecticut

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The primary goals of this thesis are to determine if the datasets of positive COVID-19 test cases and CO₂ emissions from Connecticut over the span of March 24th, 2020-October 31, 2021 are in any ways correlated. With climate change a prominent issue facing the entire world today, it is important to explore methods of providing records of past patterns of greenhouse gas emissions in order to inform decision making that could reduce future ones. Autoregressive integrated moving average (ARIMA) modeling is also implemented in this thesis to provide forecasting based on CO₂ emissions in CT starting from 2019. The most significant results from this thesis are as follows: the CO₂ emission data of transportation sectors including ground transportation, domestic aviation, and international aviation and weekly COVID-19 positive test cases data has a strong relationship during the first 28 weeks of the pandemic with a correlation of -86.34%. The CO₂ emissions experienced on average a -22.96% change of pre-pandemic vs during initial quarantine conditions and at most a -44.48% change when comparing the pre-pandemic mean to the during initial quarantine minimum value. Lastly, the ARIMA model found to have the lowest Akaike information criterion (AIC) was ARIMA(4,0,4). In conclusion, in the event of a collective global pandemic and lockdown conditions, less traveling resulting in a correlated decrease of CO₂ emissions. This means that perhaps concentrated efforts on reducing unnecessary travel could help mitigate the levels of carbon dioxide emissions as a more long term solution to climate change opposed to the pandemic's short term example.