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GLBL 550
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Final Project Proposal

1. Introduction

China's rapid economic development over the past three decades has come with an enormous rise in energy demand, and its energy-related carbon emissions grew by 6.9 times during the same period, which has turned China into the world's largest carbon dioxide emitter. Nowadays, the Chinese government has raised its awareness of environmental issues and pushed a series of air pollution control policies in the hope of fight against the air pollution issue and improve the quality of living for its citizens. Governments and media have identified massive manufacturing factories and transportation as the top two most significant emitting sectors that contributed to the level of air pollution. Stringent regulations on the emission standards of these sectors have been proposed to regulate their air pollutant emissions.

In January 2020, a novel coronavirus disease (COVID-19) outbreak first happened in Wuhan, Hubei Province, and then quickly spread to the whole country. The Chinese government posted one of the strictest emergency responses in human history by banning the traffic mobility in the entire country and issuing a large population quarantine order for people to stay at home and work from home. At the end of March 2020, new confirmed COVID-19 cases in China reported by the National Health Commission dropped to 20, and most Chinese provinces have lowered the level of emergency responses. People's producing and living patterns are getting back to normal, and the two significant emitting sectors, manufacturing, and transportation are also slowly recovering to regular status.

2. Research Objectives

While facing an unprecedented domestic or even international pandemic due to the COVID-19 outbreak, several media have reported that the air pollution issue in China has been curbed during this lockdown period. Therefore, the overarching goal of this study is to examine the improvements in air pollution levels and other associated co-benefits, such as the cause-specific mortality rate during this period. Specifically, this study will,

1) Investigate the air pollution level for different pollutants among the same period (1st quarter of the year) over the past five years in both Wuhan and Beijing-Tianjin-Hebei region;

2) Determine and quantify the other co-benefits, such as the drops of mortality rate associated with the decrease of air pollution level.

3. Data Collection and Analysis

(1) Air Quality Data

Real-time and historical air quality data of different air pollutants for major cities in China can be found on multiply websites and here are some examples:

1) Air Pollution: Real-time Air Quality Index (AQI): https://aqicn.org/city/beijing/
2) 中国空气质量历史数据：http://beijingair.sinaapp.com
3) 中国大陆重点城市空气质量 (AQI) 历史数据库：https://www.gracecode.com/aqi.html

(2) Mortality Data Associated with Air Pollution

The research on the topic of mortality and burden of disease from ambient air pollution in China has been conducted by several researchers both in China and other countries over the years. And we are planning to borrow the data used in those studies and make predictions on the future trend using Python. Here are some researches:

1) Chen R, Yin P, Meng X, et al. Associations between ambient nitrogen dioxide and daily cause-specific mortality: evidence from 272 Chinese cities. Epidemiology 2018;29:482-9.
2) Chen R, Yin P, Meng X, et al. Fine particulate air pollution and daily mortality. A nationwide analysis in 272 Chinese cities. American Journal of Respiratory and Critical Care Medicine 2017;196:73-81.

4. Expected Outcomes

A detailed write-up report and a PowerPoint presentation with histograms, bar charts and scatter plots to help the visualization of viewers.

5. Timeline

April.13th – April.17th: Data collection and consider potential modifications to both the initial research objectives and research methods;

April.17th – April.22nd: Data analysis and prepare presentation;

April.23rd: Final Presentation