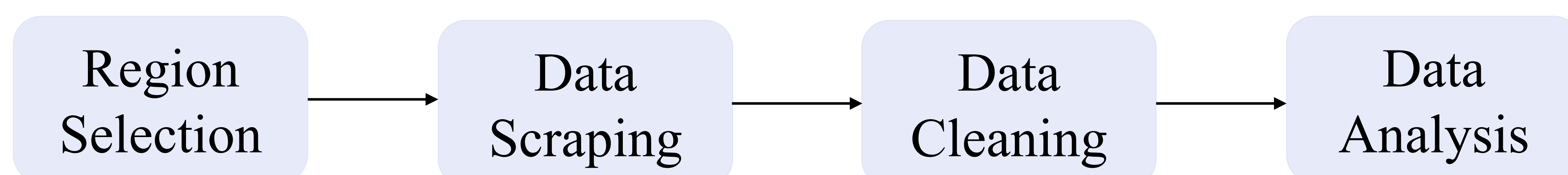


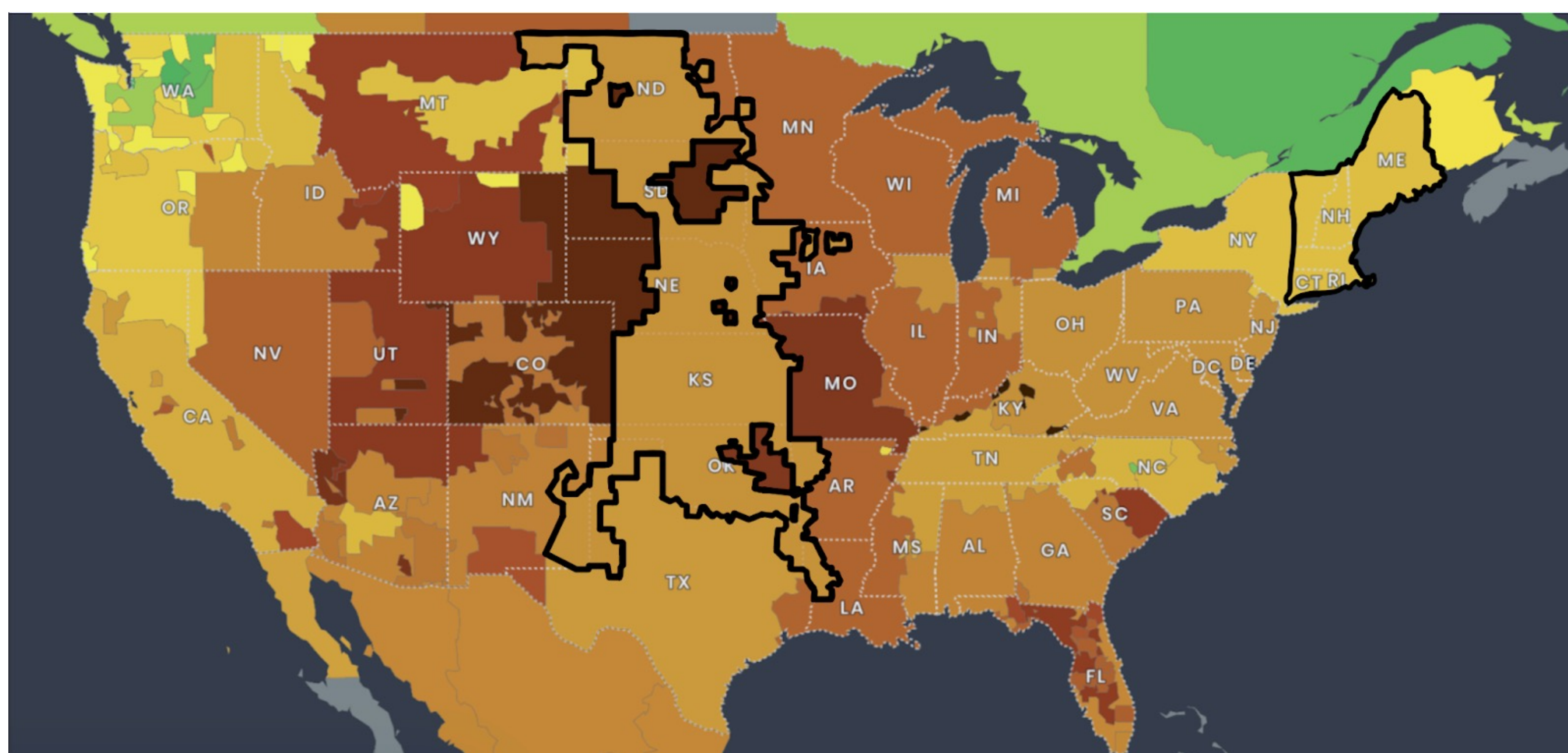
## Problem Statement

How does CO<sub>2</sub> intensity vary across different U.S. regions, and which energy sources contributed to these variations over the past three years (2021-2023)?

## Methodology



## Region Selection



Southwest Power Pool and ISO New England

## Data Scraping

Extract raw energy mix data from the electric grids' web APIs (Southwest Power Pool and ISO New England).

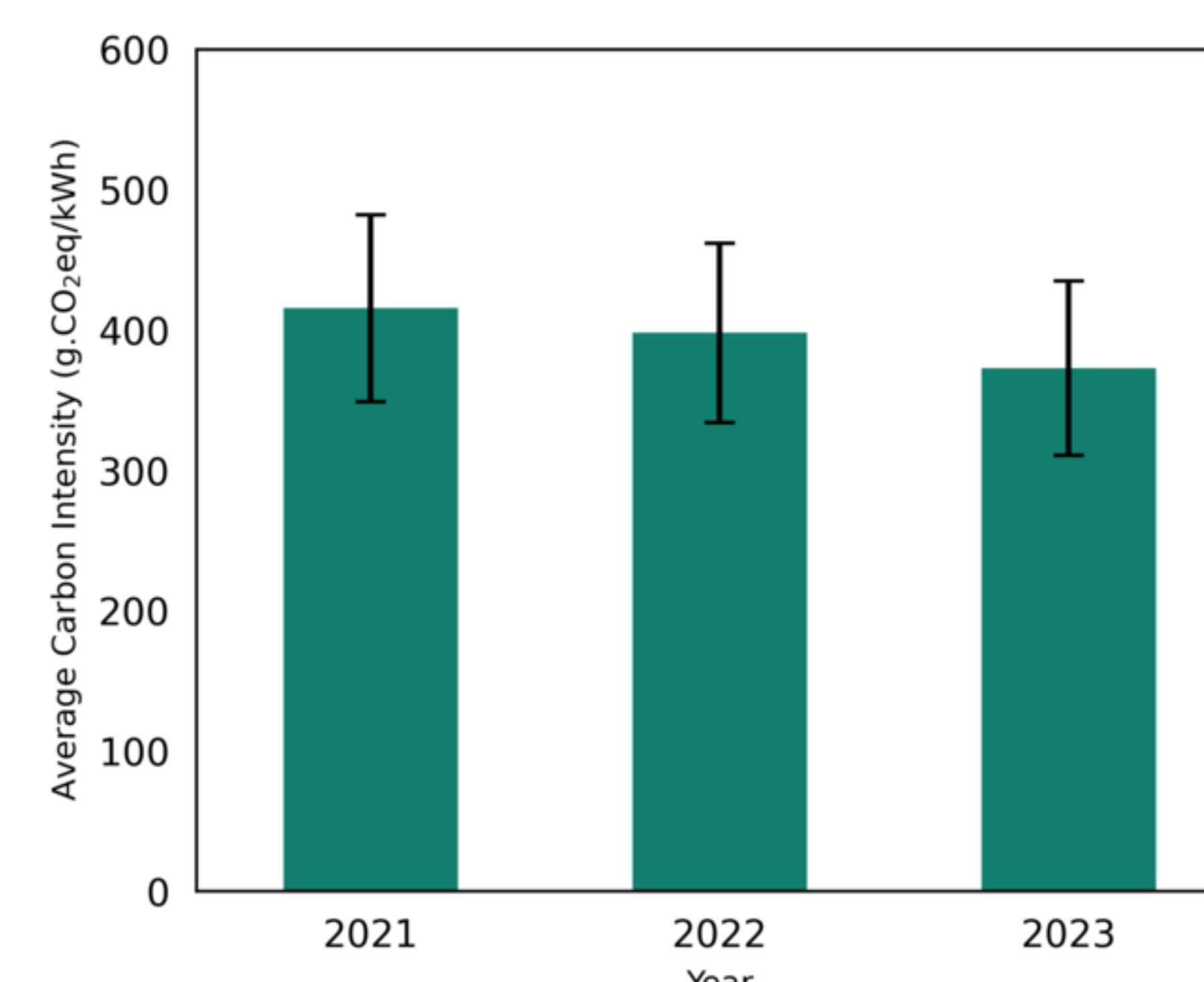
## Data Cleaning

Clean up the raw data from different sources to unify their format.

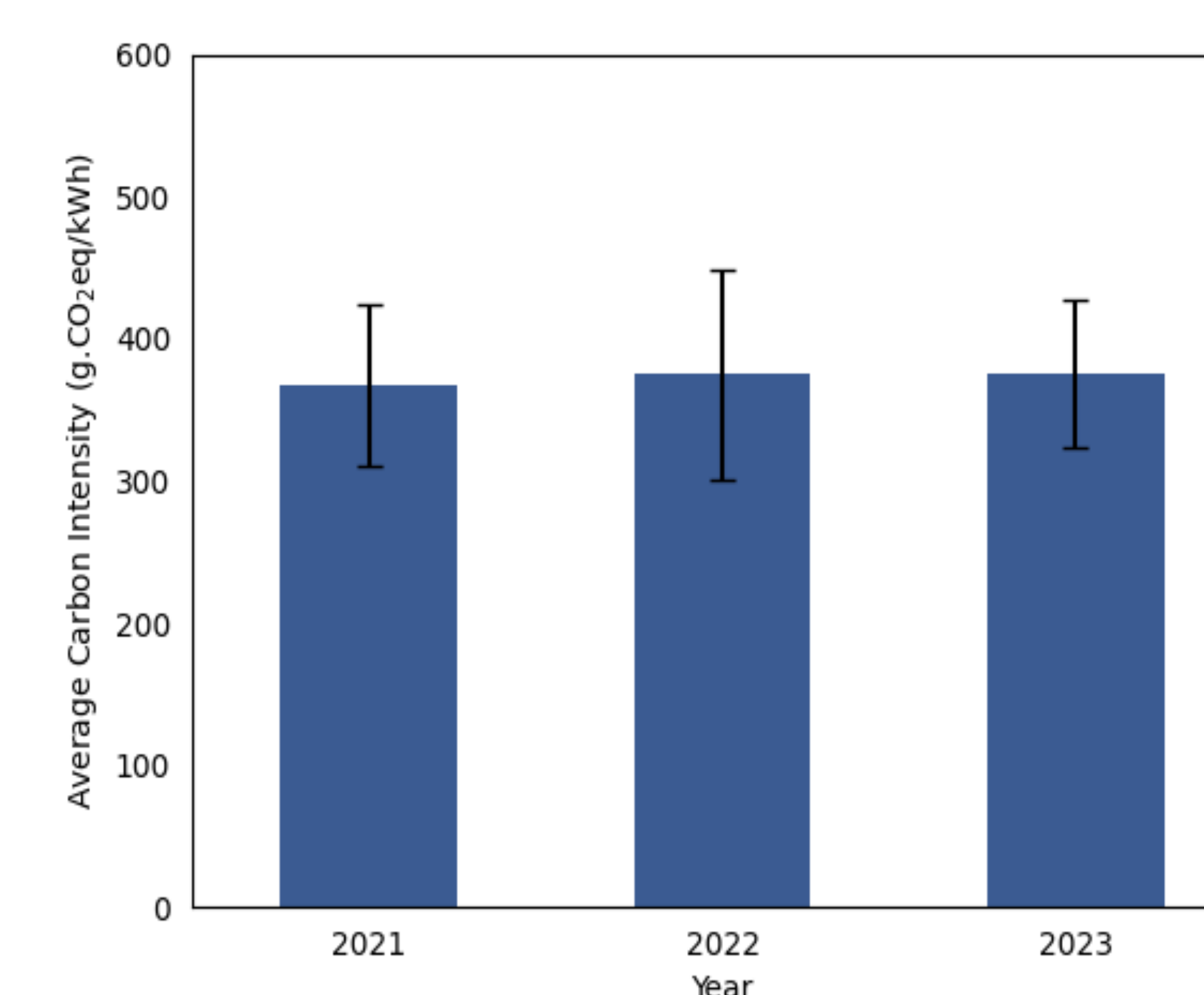
## Data Analysis

Examine data in yearly and monthly granularity.

## Yearly Average CO<sub>2</sub> Intensity (2021-2023)



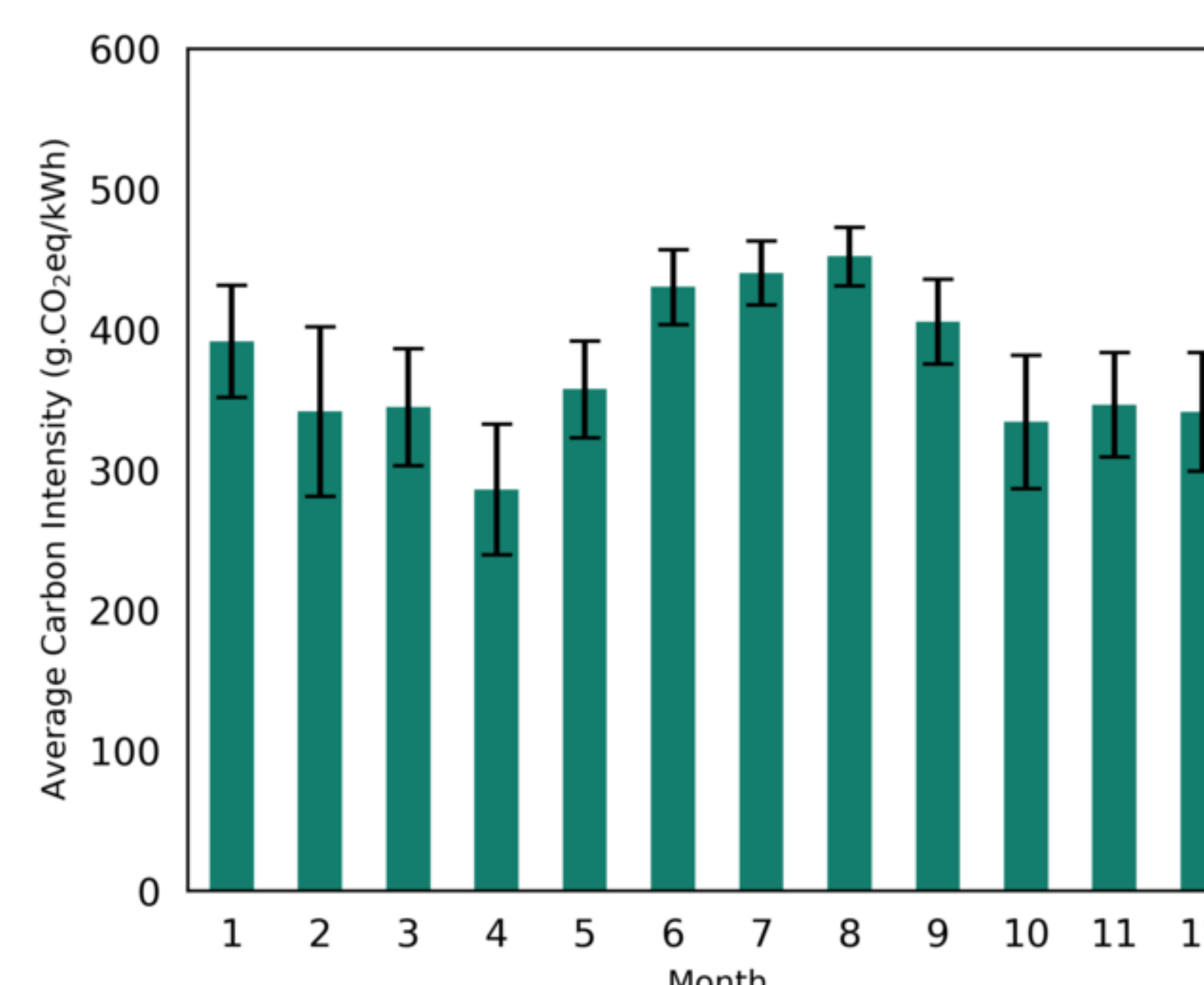
1(a) SWPP yearly



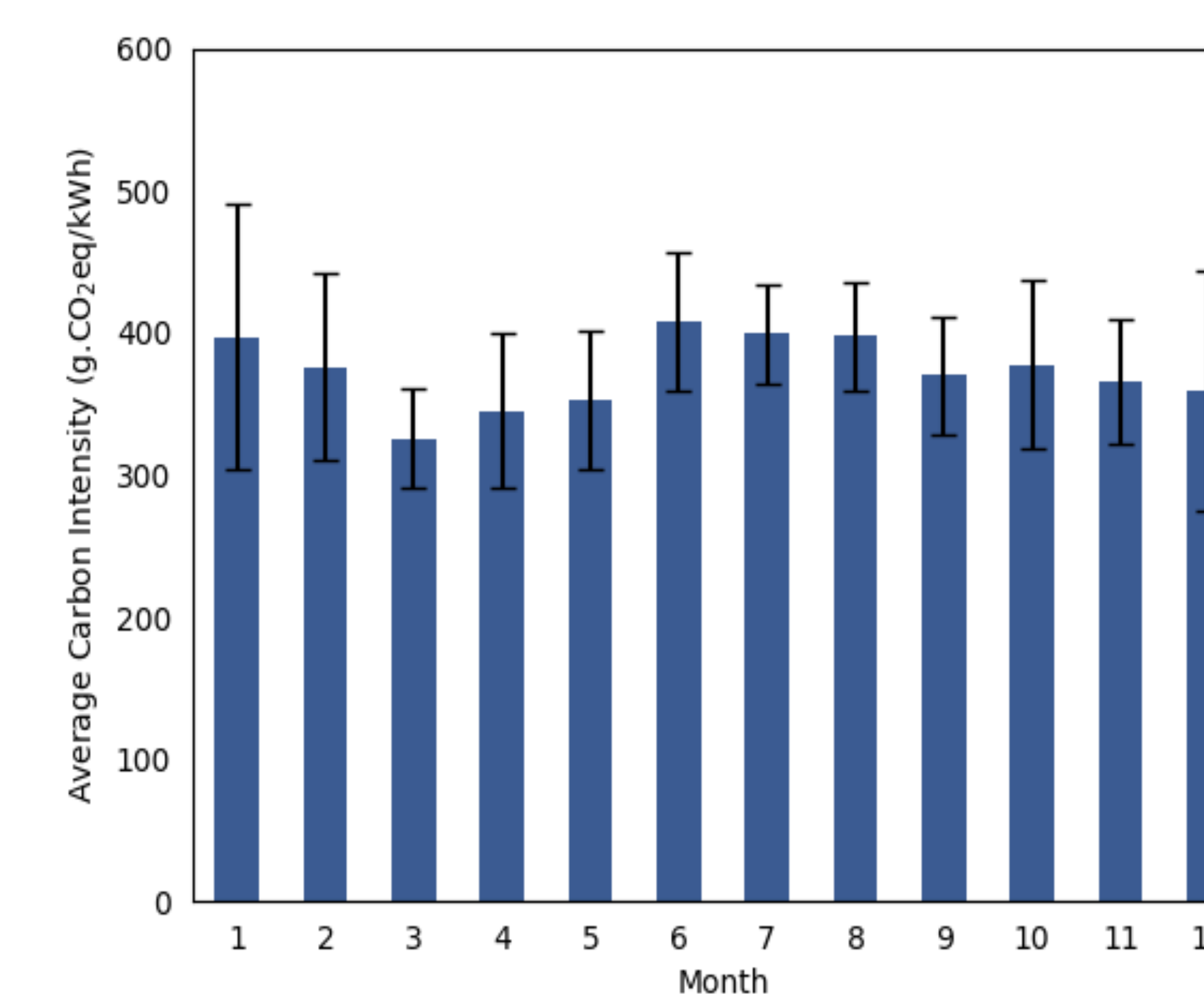
1(b) ISO-NE yearly

- High: ~420 (SWPP), ~380 (ISO-NE)
- Low: ~380 (SWPP), ~370 (ISO-NE)
- CO<sub>2</sub> intensity has small changes over the past 3 years

## Monthly Average CO<sub>2</sub> Intensity



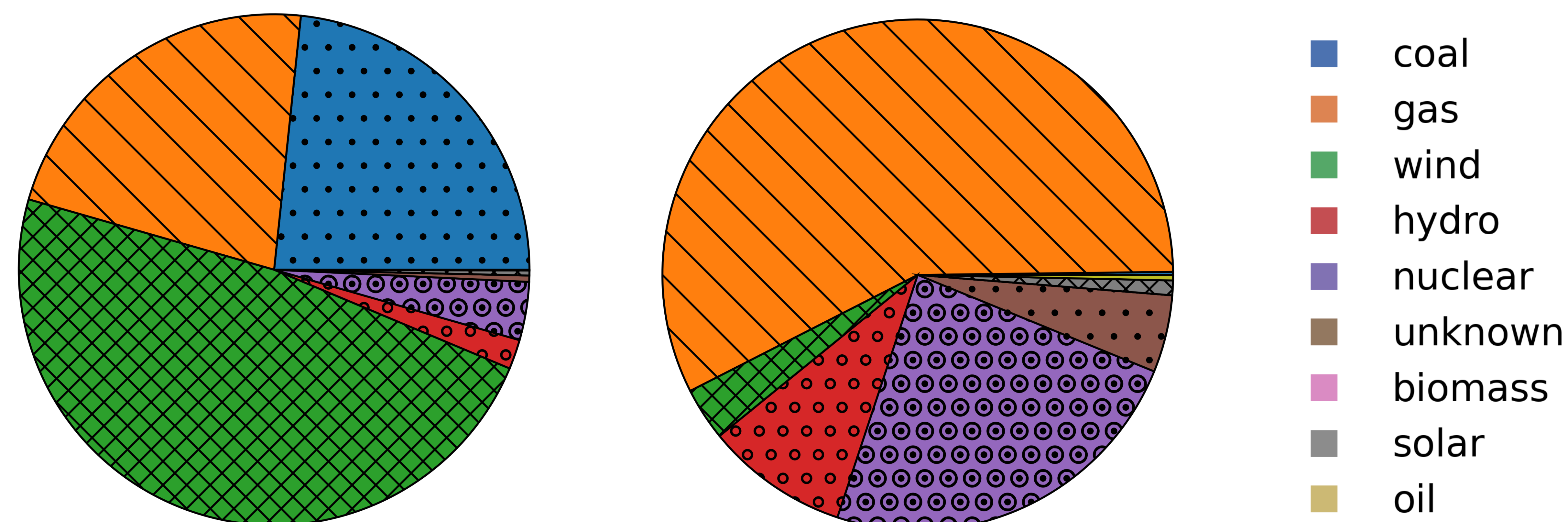
2(a) SWPP monthly



2(b) ISO-NE monthly

- There is more monthly variation in figure 2(a) as compared to figure 2(b) due to high renewable ratios

## Energy Mix



## Conclusion

While high renewable ratio implies low carbon intensity, it also means that there are high variations in carbon intensity. This emphasizes the need for different fields to come up with solutions on how to harness low carbon, but high variation energy sources to reduce carbon footprints.