

## Exercise 3 Report: Exploring CO2 Emission Levels

### Motivation

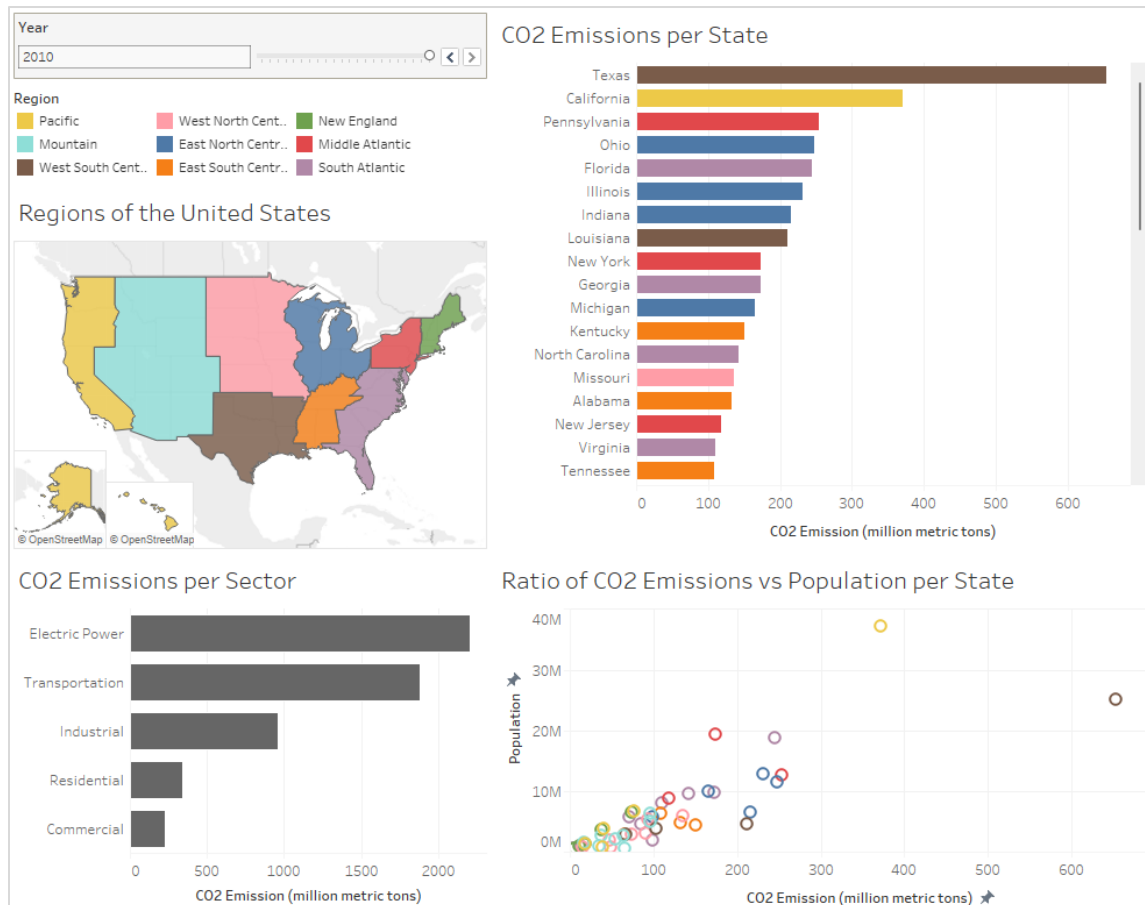
Data exploration is hard, but well-made visuals can make that process easier. This Tableau dashboard seeks to illuminate the CO2 emissions as sorted by or grouped by any combination of year, sector, and state. Additional data (the state's population and the ratio of CO2 emissions to state population) is also easily accessible for further data exploration. It is possible for this data visualization to be more helpful to non-data-analysts rather than strict data analysts. Much user interaction is required.

### Data Augmentation

One additional dataset was merged with the original co2-population dataset. This was the 9-US-Regions dataset (found in the submitted folder), gathered from Wikipedia's "[List of regions of the United States](#)" page. This augmentation was done in effort to simplify the map of clickable states, since clicking on 1 of 50 on a small map can be cumbersome, and because there may be trends between states that are physically close to each other as regions denote.

### Tasks

This visualization is intended to allow users to easily select and view CO2 emissions based on year, state (or region), and sector rather than searching through a spreadsheet for information. The information is easily accessible and presented in a more interesting way that can be shared with people other than data analysts, such as experts, executives, and even laypersons.

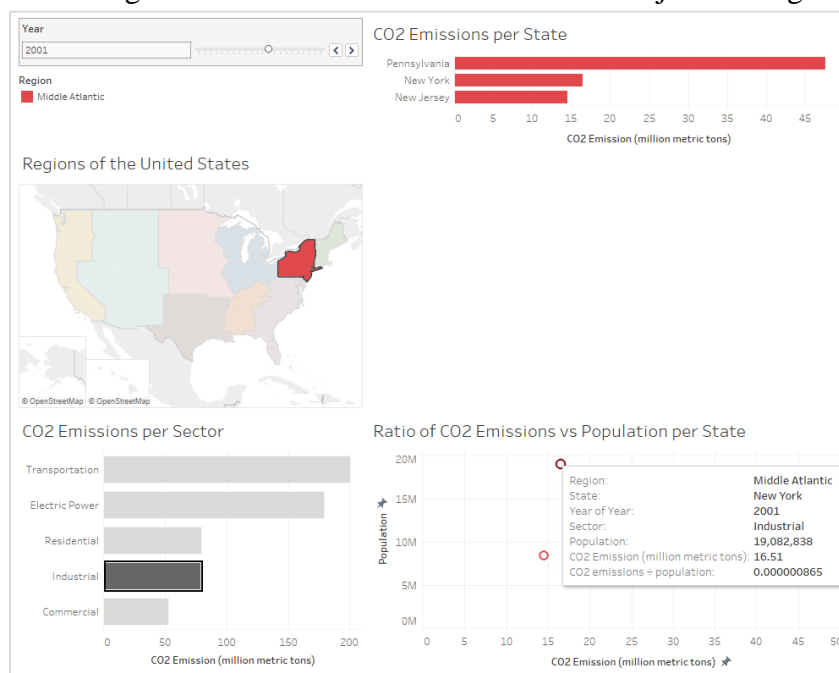


## Expressiveness of Design

This design relies heavily on ease of interpretability, meaning that map data is shown on maps, and values associated with a label (state or sector) are displayed as bar charts. A scatterplot is used to highlight the relationship between state population and CO2 emissions, and hovering over any state's datapoint reveals the ratio of CO2 emissions per state ÷ state's population. All x-axis of the non-map charts are CO2 emissions, and the two most prominent state-related charts are adjacent to each other. Additionally, a small amount of color is used to increase the ease of interpretability. The slider for selecting the year is marked off lightly and makes it stand out as a key inter-action on this Tableau dashboard. And given that this visualization is for understanding and reading the CO2 emissions, bar charts are sorted by the CO2 emission values rather than their labels.

## Effectiveness of the Solution

Though a little bit of clicking-around might be needed to fully grasp the capabilities of this Tableau dashboard, the use and readability of this data visualization is effective. Clicking a region highlights just the data related to that region, and clicking on individual states does similar, as does clicking on the sectors. The limited number of colors creates small—but not negligible—amount of through-lines between the three colored charts. These colors were also run through various color-blind simulations and adjusted for greater visibility than the default colors allowed.



colors allowed.

## Interaction

This data visualization relies extremely heavily on interactions. Users can select any year (between 1990 and 2010), any US region (or multiple regions) from the legend *or* map, any state (or multiple states) from the CO2 Emissions per State bar-chart, and any sector (or multiple sectors) from the CO2 Emissions per Sector bar-chart. Doing this (and doing combinations of these) will filter the four charts accordingly. The Ratio

scatterplot can be interacted with by hovering over datapoints to see the ratio of CO2 emissions per state ÷ state's population. The CO2 Emissions per State bar-chart also has a scroll-bar due to the number of states in the dataset.

## Conclusions

Solving problems and answering questions through data visualization can also come in the form of assisting with data exploration. In such cases, ease of interpretability is very important, and making clearly understandable data visualizations is important, as users should be spending more time getting information from the visualization than understanding it.