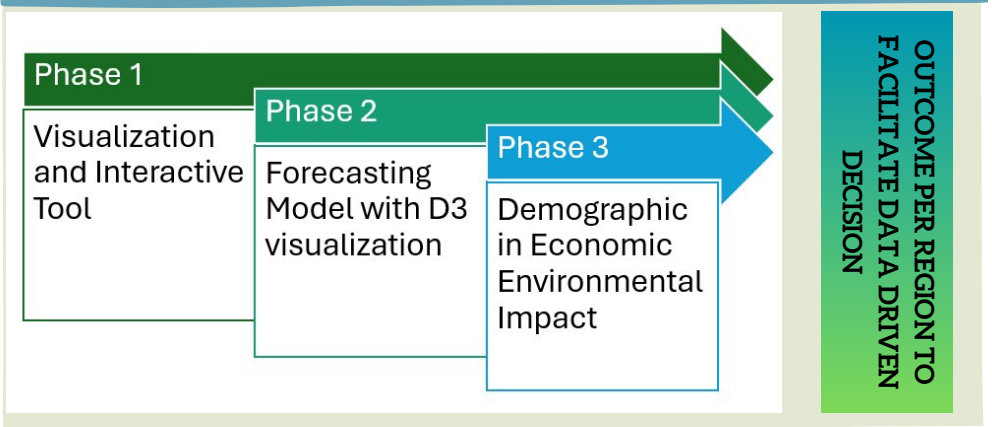
EMISSION EXPLORER

Alicia Dawn Taylor; Namra Ghafoor; Sharvari Sunil Mhatre; Shweta Saxena
Georgia Institute of Technology
{ataylor366; nghafoor6; smhatre34; ssaxena71}

INTRODUCTION

Our objective is to facilitate strategies to achieve the United States Federal Government's goal of reducing Greenhouse Gases (GHGs) and achieving carbon net neutrality by 2050. This federal goal is currently being implemented through laws and policies. This project aims to aid these stakeholders with visualization and analytical resources for continuous reduction of one of major contributor of GHG i.e. CO2.

ANALYSIS APPROACH FOR EACH REGION



DATA OVERVIEW

The Emissions & Generation Resource Integrated Database (eGRID) released by the Clean Air Market Division (CAMD), Office of Atmospheric Programs (OAP) and U.S. Environmental Protection Agency (EPA) from year 1996 to 2022. It is published in Excel sheet with one year delay with a API provision to export data.

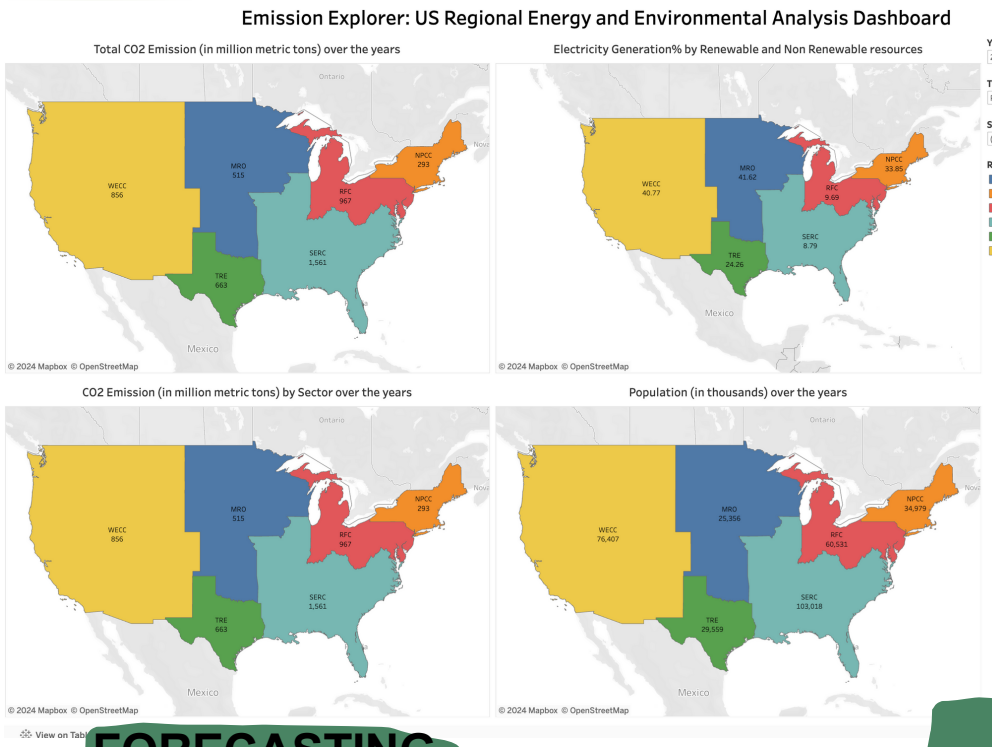
NERC REGION

NPCC	Northeast Power Coordinating Council
MRO	Midwest Reliability Organization
WECC	Western Electricity Coordinating Council
RFC	Reliability First Corporation
SERC	Southeast Reliability Corporation
TRE	Texas Regional Entity

NERC : North American Electric Reliability Corporation

TOOLS

tableau, python, D3, XLS



INTERACTIVE DASHBOARD

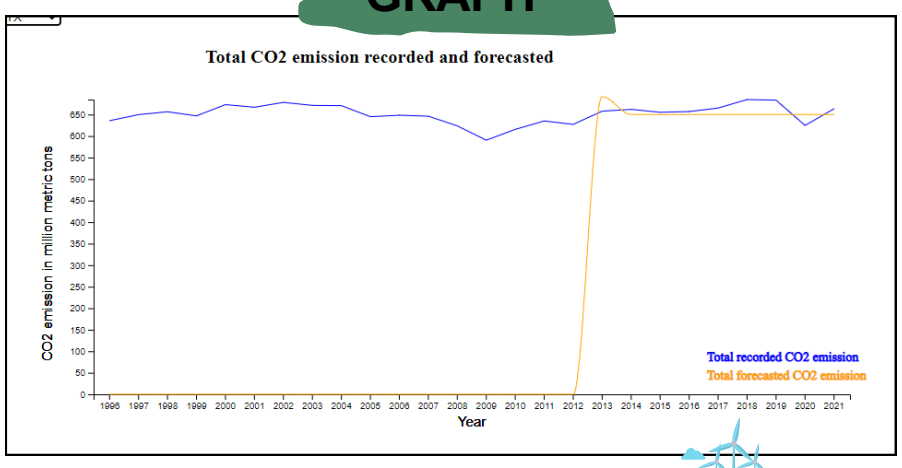
Dashboard is build using Tableau visualizing four US regions maps showcasing:

1. Total CO2 emissions over the years.
2. Distribution of Energy Generation by Renewable and Non-renewable Sources over the years.
3. CO2 emissions divided by sectors over the years.
4. Population over the years.

FORECASTING MODEL

Region	Selected Model
SERC	Exponential smoothing with smoothing level of 0.2
MRO	Exponential smoothing with smoothing level none
NPCC	ARIMA (1,0,1)
RFC	ARIMA (0,0,2)
WECC	Exponential smoothing with a smoothing level of 0.5
TRE	ARIMA (0,0,2)

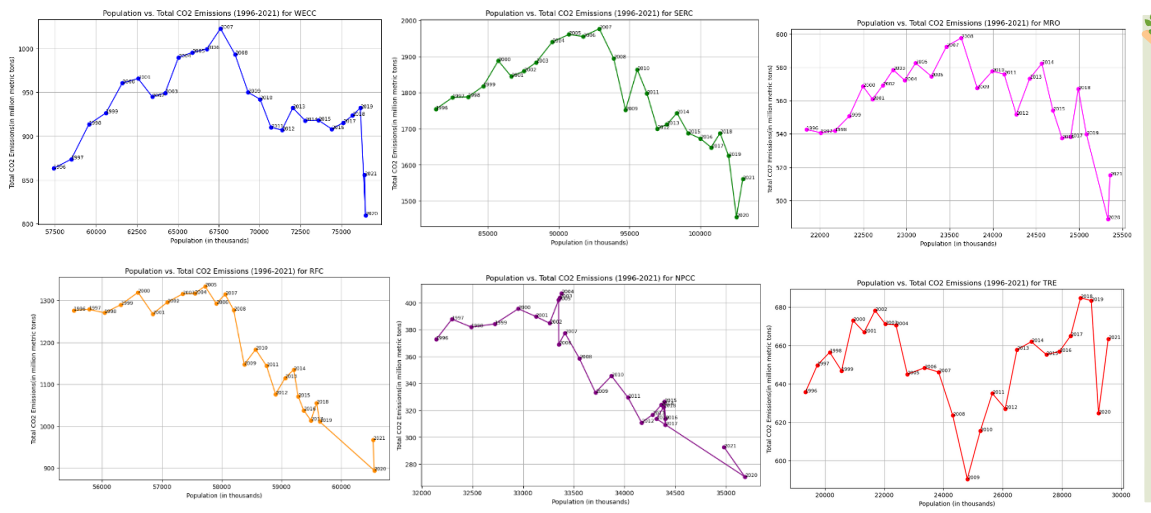
D3 GRAPH



CORRELATION ANALYSIS

Region	Correlation 1996-2021	Correlation 2008-2021
SERC	-0.6301	-0.8804
MRO	-0.2946	-0.8117
NPCC	-0.8612	-0.9271
RFC	-0.8562	-0.9284
WECC	-0.2282	-0.6884
TRE	0.0282	0.7115

ECONOMIC KUZNETS CURVE



Correlation quantifies the strength and direction of the linear relationship between population and CO2 emissions over time. Economic Kuznets Curve's (EKC) shape helps to gain insight of relation direction between population and CO2 emissions. Thus, using correlation and EKC together helps us to identify impact of population over CO2 emissions.