Final Report: Climate Action

Odette School of Business, University of Windsor

BSMM 8750 – Section 02 - Predictive Modelling & Decision Making

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Group 01

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Introduction and Background

The driving force behind picking up this topic of Climate change was, as Climate change and global warming are becoming the biggest threat to the entire world and the number of individuals getting affected directly or indirectly because of the climate is exponentially increasing day by day, Hence it has become an urgent necessity to start working on this and all the nations have started putting on the plans and timelines to get these things in control to create a better place for the upcoming generations. Also, there have recently been so many floods, excessive rains, warming of the earth, and other natural disasters that made us think about this topic. Having thought about this we as the team decided to get insights about what are the factors which are leading to this such as changes in sea level, Carbon Emissions, Greenhouse gas, etc. Few of the team members were curious about this topic, while others had solid experience in working with different datasets and had a similar interest in analyzing the data as well as the fact that team members wanted to work for such an industry in the future, made it clear that we should pursue this topic to advance our abilities, gain a better understanding of the tool, and learn how to analyze the data to gain insightful conclusions and help the world to be a better place.

Dataset

Where did you find the dataset?

There are more than 10 datasets in total and were found and collected from World Bank, IMF and OECD which is a subsidiary organization of World Bank.

**How large is the dataset (cases, variables)?**

The 10 datasets altogether have more than 50 columns which we have analyzed. It has Mean surface temperature change, Sea level rise, drivers behind GHG and CO2 along with many other related factors.

What locations are included in the dataset?

Since we are working on Climate change at the world level and comparing it with Canada, so it includes all the countries.

Climate Action: What is Happening?

Climate Change has a significant impact on Surface Temperature change and burning the planet from North Pole to the South Pole as it can be seen in the Map chart below. The global average surface temperature has increased by more than 1.5 C on average since last 5 years. Out of the countries most effected Tunisia, Iraq and Canada are among the top 3 countries with highest temperature rise. The impacts of rising temperatures aren't waiting but are coming faster than expected and causing ocean heat due to which sea level rise is increasing, more disasters causing more displacements along with other factors. It has also been observed that the last five years have been the warmest across the entirety of recorded human history worldwide.
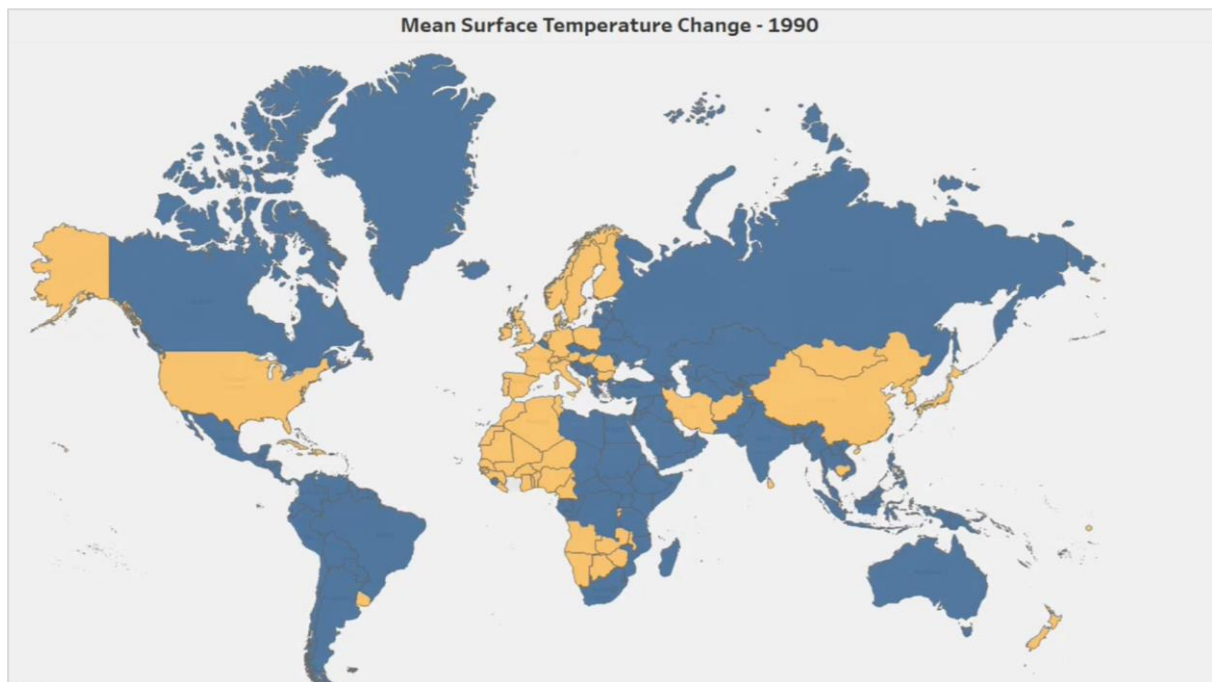

The map above shows the increase in mean surface temperature change from the year 1990 till 2021. The red countries shows that the mean surface temperature is increasing by more than 1.5 degree Celsius having a major impact due to climate change. The two map charts clearly shows that the climate change has a major impact on temperature change.

The Climate Change has a major impact on Ocean as it causes increase in sea-level due to its heat which further causes expansion of seawater and melts ice over land, which then adds water to the ocean.

Ocean Heat is Increasing
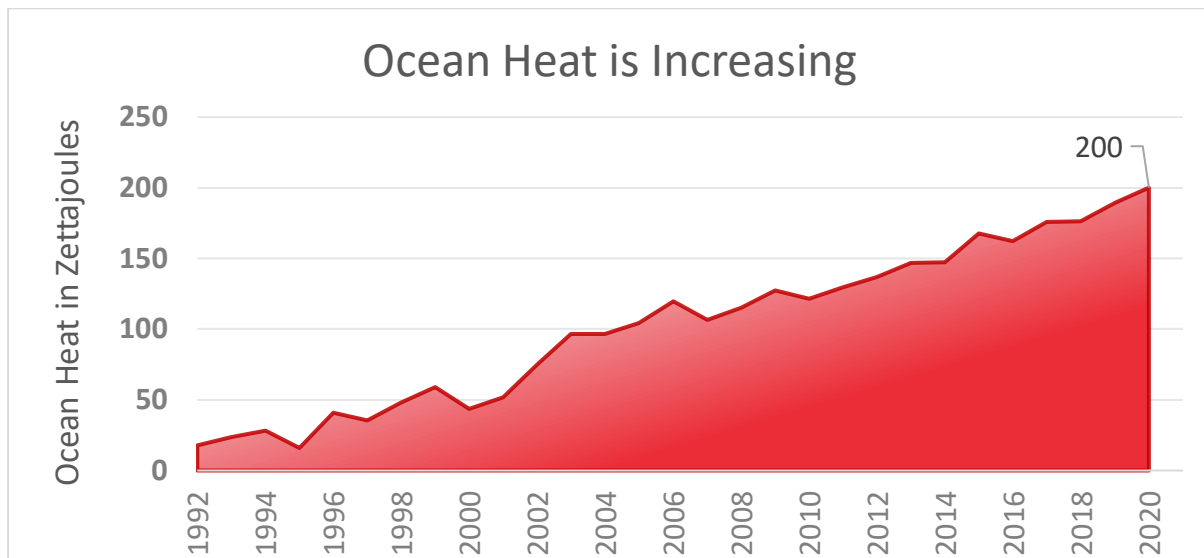
The chart above depicts the rise in ocean heat. The variables used in the above visual are Year, amount of heat content stored measured in zettajoules from the dataset named "Ocean Heat" which was collected from IMF. The area chart above shows that ocean heat is increasing every year i.e., 1992 till 2020. It also shows that ocean heat has increased to around 200 Zettajoules with the change in ocean heat from 1992 till 2020 and we can also see a significant increase of 45% from the year 2015 till 2020.

Mean Sea level is Rising
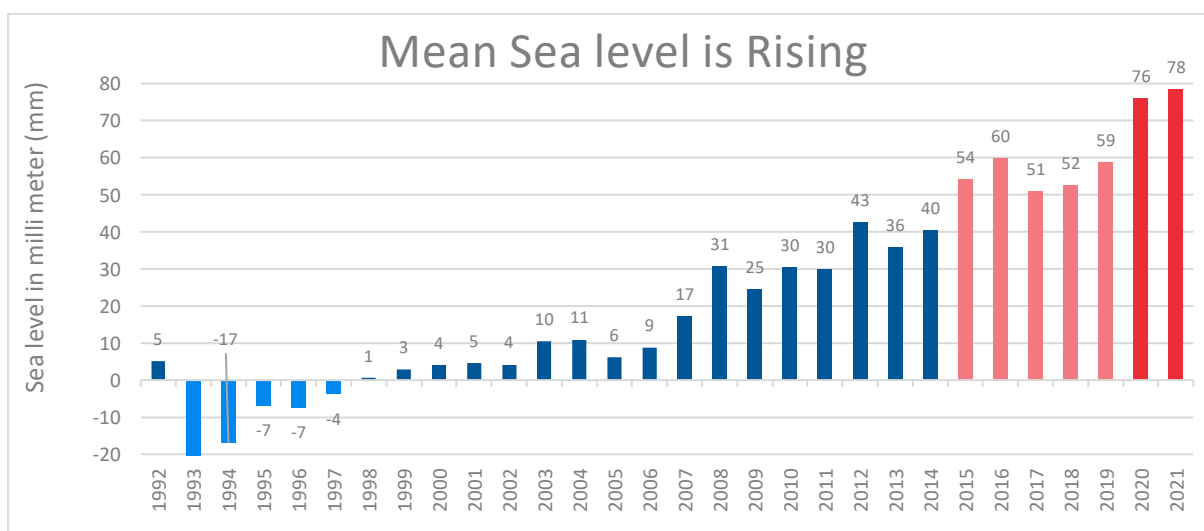
The chart above depicts the rise in Sea Level. The variables used in the above visual are Year, amount of sea level rise measured in millimeter(mm) from the dataset named "Mean_Sea_Level" which was collected from IMF. The bar chart above shows that sea level is increasing from the year 1992 till 2020 with a few exceptions. It also shows that sea level has significantly increased by around 45% from the year 2015 till 2020. It also shows us an alarming situation where from 1993 till 1997 sea level was decreasing but it has been increased to the 78mm.

Widespread changes in weather patterns are linked to an increase in the global average temperature. These charts further support our story that a human-induced climate change disasters are increasing with the time and can have severe impact on them and cause displacements due to the observed reasons such as variations in temperature, storms, floods, and droughts
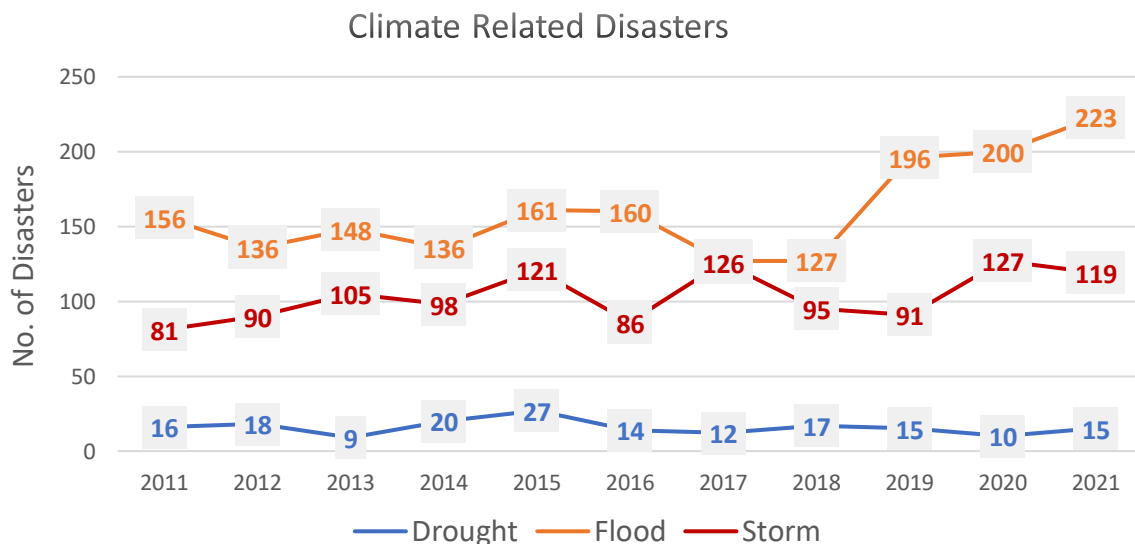
The chart above depicts the increase in climate related disasters. The variables used in the above visual are Year, type of disasters, no. of disasters from the dataset named "Climate_Disasters" which was collected from World in Data. The line chart above shows the increase in different types of disasters. It also can be depicted that a major increase of 2,374

disasters were caused from the year 2015-2021 of which a significant increase of 76% were found in the increase of floods since 2015.
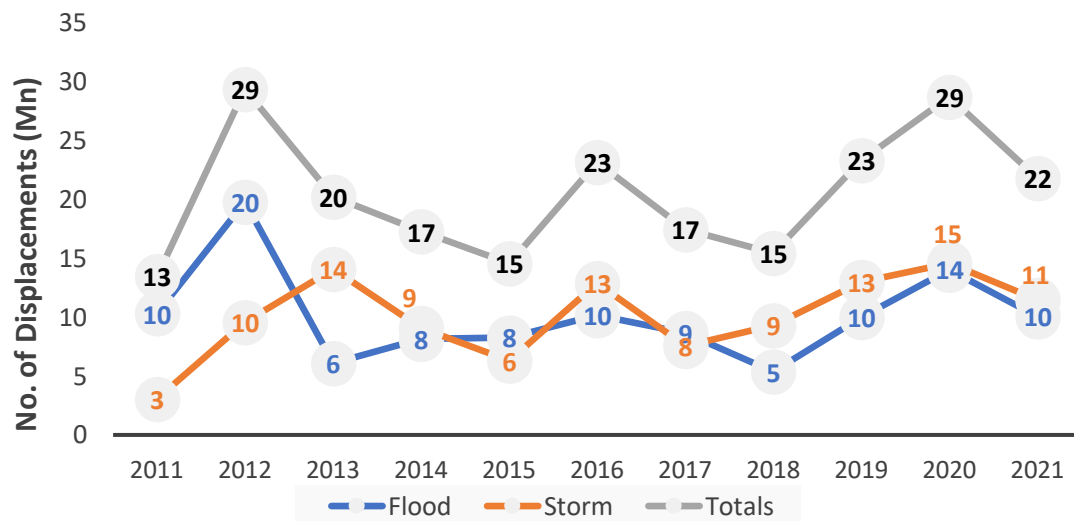
The line chart above depicts the increase in total number of displacements due to flood and storms. The variables used in the above visual are Year, type of disasters, no. of displacements in millions from the dataset named "Climate_Displacements" which was collected from Our World in Data. The line chart above shows the increase in displacements due different types of disasters. It also can be depicted that a major increase of 141.5 million people were displaced globally due to storms and floods from the year 2015-2021. The line chart above shows the total count of displacements due to Flood and Storm and a count of flood and storm within the total displacements.

Drivers behind Climate Change

The primary driver behind climate change is Green House Gas (GHG emissions). As we analyzed data the data from World bank, we found that the GHG emissions have risen by almost 7% from 2020 to 2021. The major contributor to this GHG emissions is CO2. The major source of GHG emissions is the energy sector.
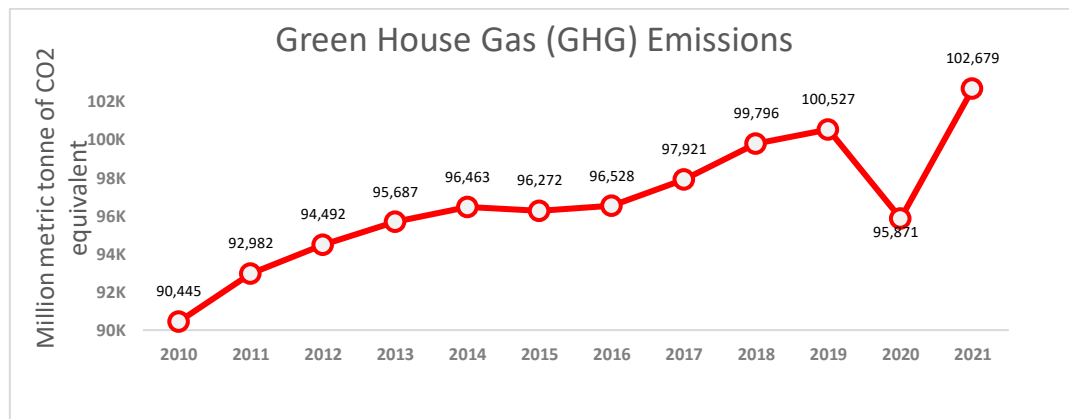

Around 64% of energy in the world is generated by burning fossil fuels which is the major contributor of GHG emissions. Energy sector alone contributes 38% of GHG emissions followed by Manufacturing sector which stands at 27%.
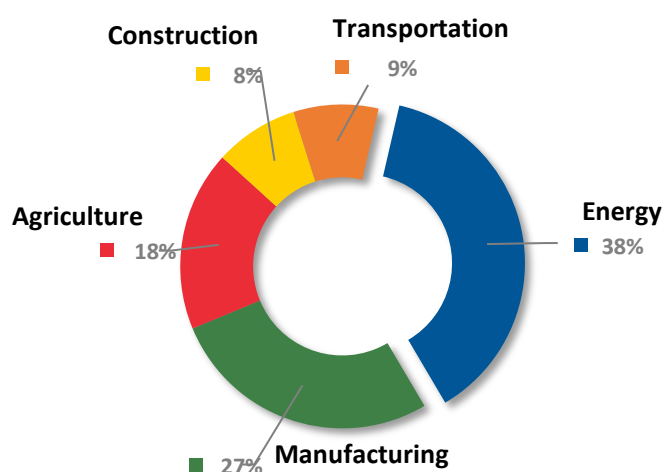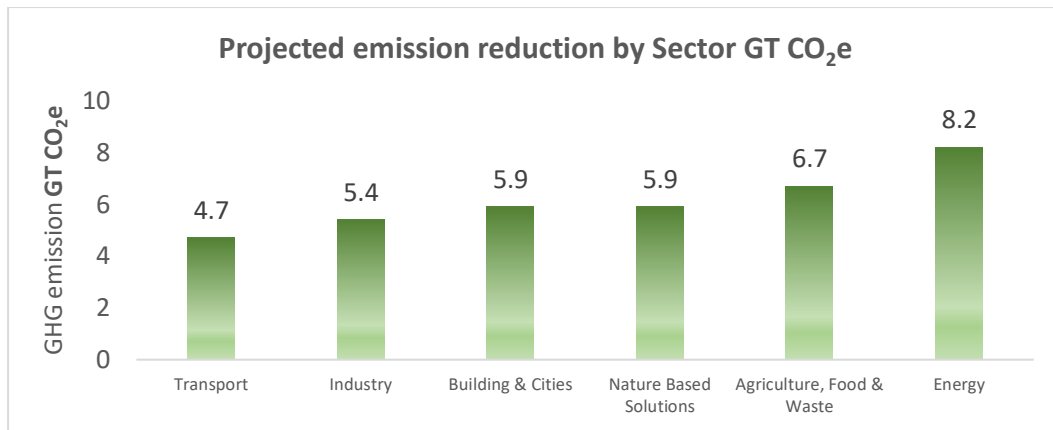
Steps Taken to Combat Climate Change

The first chart shows the various carbon emission control initiatives being taken across the world, with Emission Trading System (ETS) and carbon tax being the two most widely used. A total of 46 national jurisdictions worldwide are covered by these initiatives. Carbon tax is simply a tax placed on per ton of carbon dioxide emissions done by a country. ETS, on the other hand, is where countries can buy and sell permits – of carbon dioxide emissions allowed - amongst themselves.
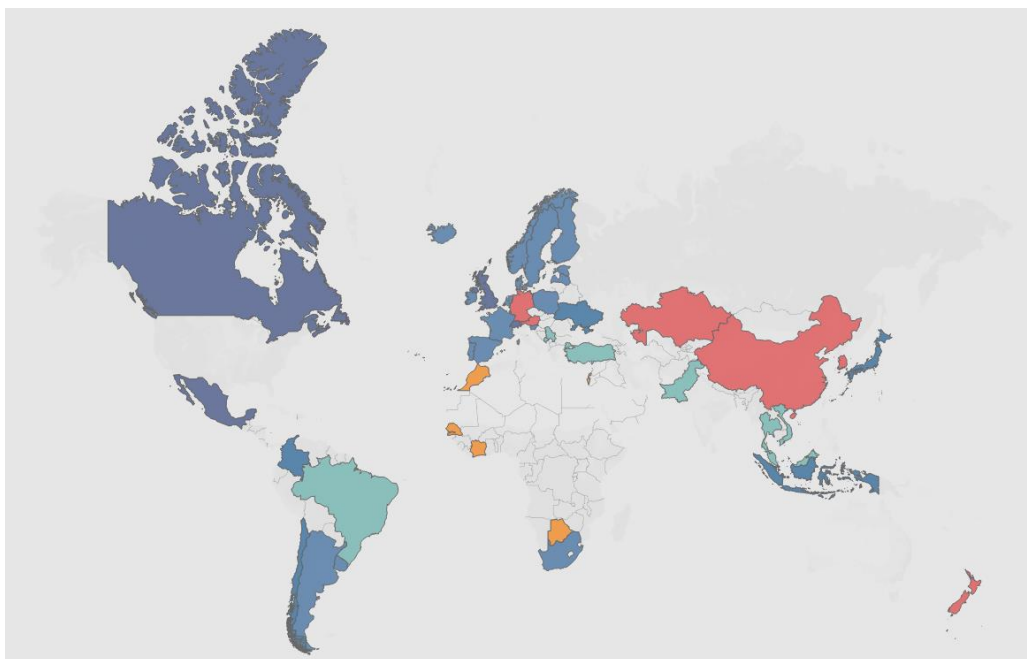
Based on the implementation of these initiatives, it is projected that there will be a reduction in carbon dioxide emissions by almost thirty giga tons. The second chart illustrates how this reduction in emissions is distributed across various sectors. We can see that if the carbon control policies are implemented successfully then the agriculture, food and energy sector are likely to contribute almost half of the total reduction in carbon dioxide emissions.

Projected emission reduction by Sector GT CO$_2$e

Sector	GHG emission GT CO$_2$e
Transport	4.7
Industry	5.4
Building & Cities	5.9
Nature Based Solutions	5.9
Agriculture, Food & Waste	6.7
Energy	8.2

This chart shows the progress Canada has made with its contribution towards reduction in greenhouse gas emissions. We can see a province wise breakdown of total percentage reduction in greenhouse gas emissions. The chart shows that Nunavut, Saskatchewan, and Newfoundland had the maximum reduction (more than thirteen percent) in greenhouse gas emissions. Ontario and Quebec were somewhere in the middle with a reduction of about ten percent only. The least contributing provinces were British Columbia and Manitoba with just four and almost zero percent emission reduction respectively.

Summary and Conclusion

Apart from the efforts that are being taken by United Nations, the governments, and the jurisdiction, it is important that we as an individual also take measures to combat climate changes. At a global level there are several policies and tax systems that have been implemented and are scheduled to be implemented, also there is a push to utilize the renewable sources of energy to generate electricity and use of electric vehicles to reduce GHG emissions. As individuals we can also help to reduce GHG emissions by taking small steps that will bring a significant contribution. We can start saving energy at home by switching off lights and fans that are not needed, by using energy efficient electrical equipment's this can reduce approx. 900Kg of CO2equivalent per year. We can start using public transport systems and walk or bike for a short distance instead of using individual car, this can help reduce nearly 2 tons of CO2 equivalent. Also, we need to follow the principle of reduce, reuse, and recycle, this can also help reduce emissions. In addition, while following the above steps we need to raise awareness as climate action is a task for all of us.

Save Energy at Home
can reduce **900 kilograms** of CO2e per year

Walk, Bike, Public Transport
can reduce **2 tons** of CO2e per year

Reduce, Reuse & Recycle
can reduce **17 kilogram** of CO2e per year

Raise awareness
Climate action is a task for **all of us**
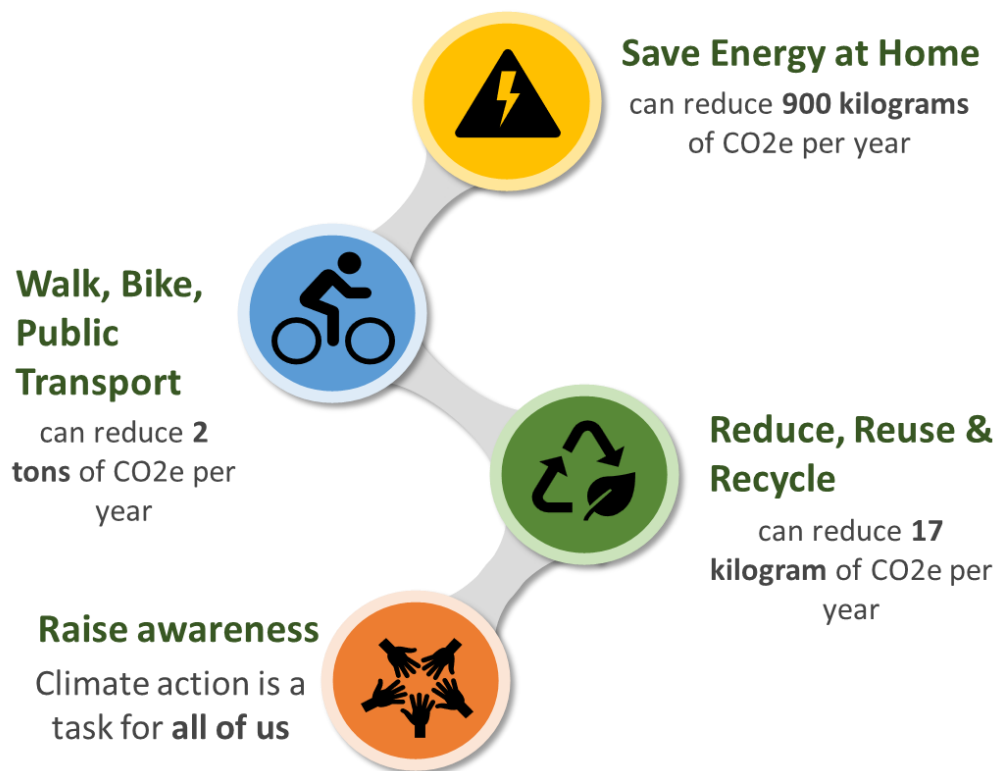
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Economic Activity Indicators. (n.d.). https://climatedata.imf.org/pages/re-indicators

Contributions

Ank Tiwari – Research the Topic of Climate change and gathering Data related to Climate change (Avg. surface temperature rise, data related to Ocean heat and Sea level rise), cleaning the gathered data and creating charts in tableau, create story in tableau and powerpoint presentation

Karan Kaushik Dave – Gathering Data related to Climate change (Climate related Disasters), cleaning the gathered data, create chart on the gathered data and preparing meeting minutes

Meet Patel – Gathering Data related to Climate change (People displacement), cleaning the gathered data, create chart on the gathered data and preparing introduction and background in report

Shivam Goyal – Research the Topic of Climate change and gathering Data related to Climate change (GHG Emissions across sectors, Policies implemented at global level), preparing, and refining the overall story and powerpoint presentation

Syed Murtaza Hassan – Research the Topic of Climate change and gathering Data related to Climate change (Climate funding and Projections for GHG emissions reductions), cleaning the gathered data, and creating charts in tableau, coordinating, and collaborating with team members and scheduling team meetings

Zain Haider – Research the Topic of Climate change and gathering Data related to Climate change (Climate related policies and Canada's progress on climate change), cleaning the gathered data, and creating charts in tableau, and gathering insights from the charts