

UNEARTHING THE ENVIRONMENTAL IMPACT OF HUMAN ACTIVITY : A GLOBAL CO₂ EMISSION ANALYSIS

PROJECT SUBMITTED TO BHARATHIYAR UNIVERSITY FOR NAAN MUDHALVAN SCHEME

FOR THE AWARD OF THE DEGREE OF

B.Sc.PHYSICS

Submitted By

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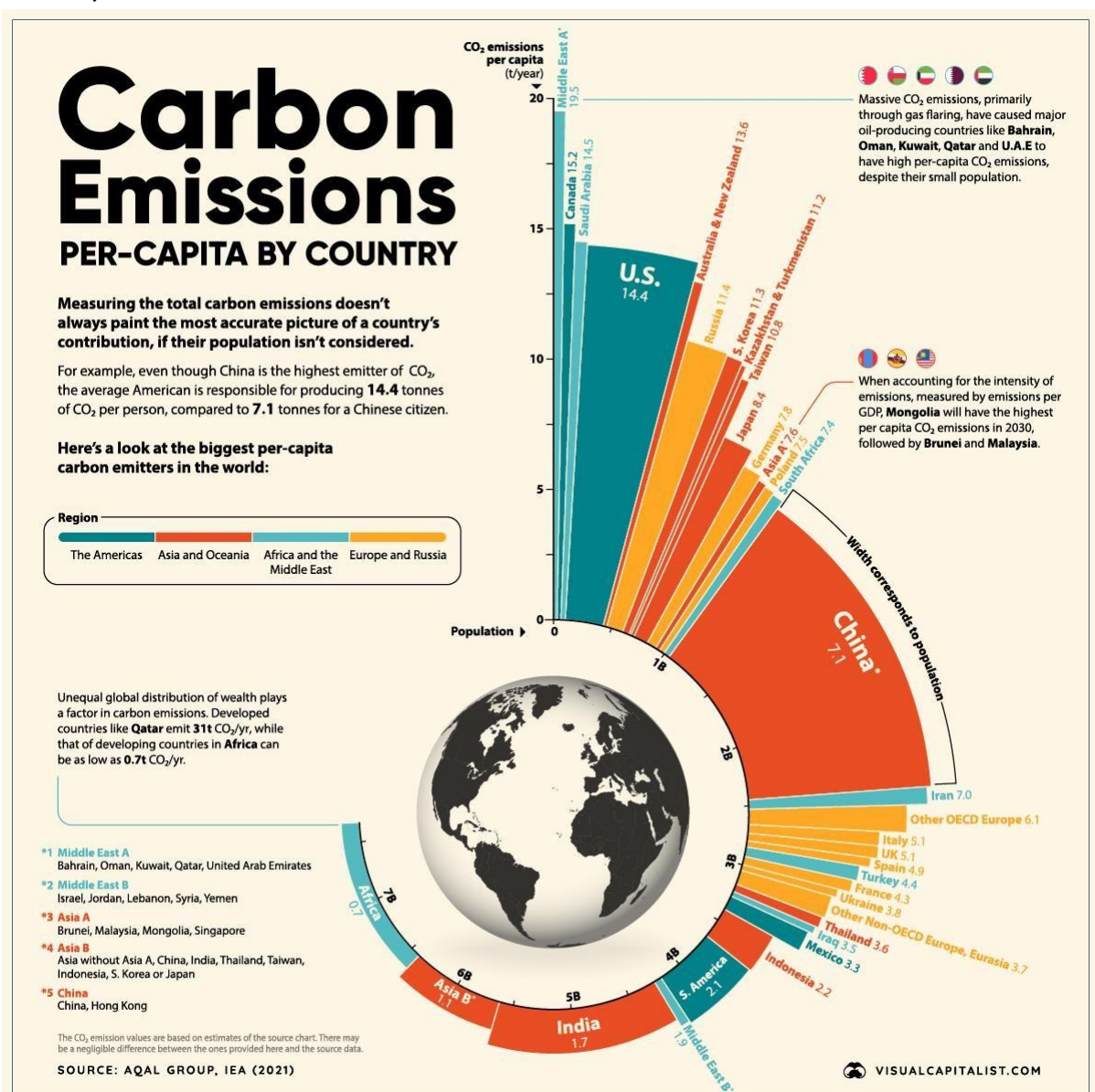
1. INTRODUCTION:

- overview:

Global warming is one of the biggest challenges currently being faced by the human race, although correlation is not causation, a likely cause of global warming is due to increased atmospheric carbon dioxide from human activities. **CO2 Emission** refers to the Carbon Dioxide emitted throughout the world. For this analysis we will be focusing on CO2 Emissions and its effect on the world we live in as well as some key factors and stats that may play a role in the emission of CO2 globally. Fossil fuel use is the primary source of CO2. The data throws light onto how much fossil fuels are burnt, per

year per nation, which amounts to an increase in CO₂ every year. This will help researchers and environment experts to predict global warming. So countries should set a goal to decrease this amount yearly.

Analysing Global Co₂ Emission across countries from 1975 to 2020. This dataset contains a record of Co₂ Emission by each Country and Region of Earth, here we are going to analyse and visualise Country wise,



Region wise and Overall Co₂ Emission on Earth.

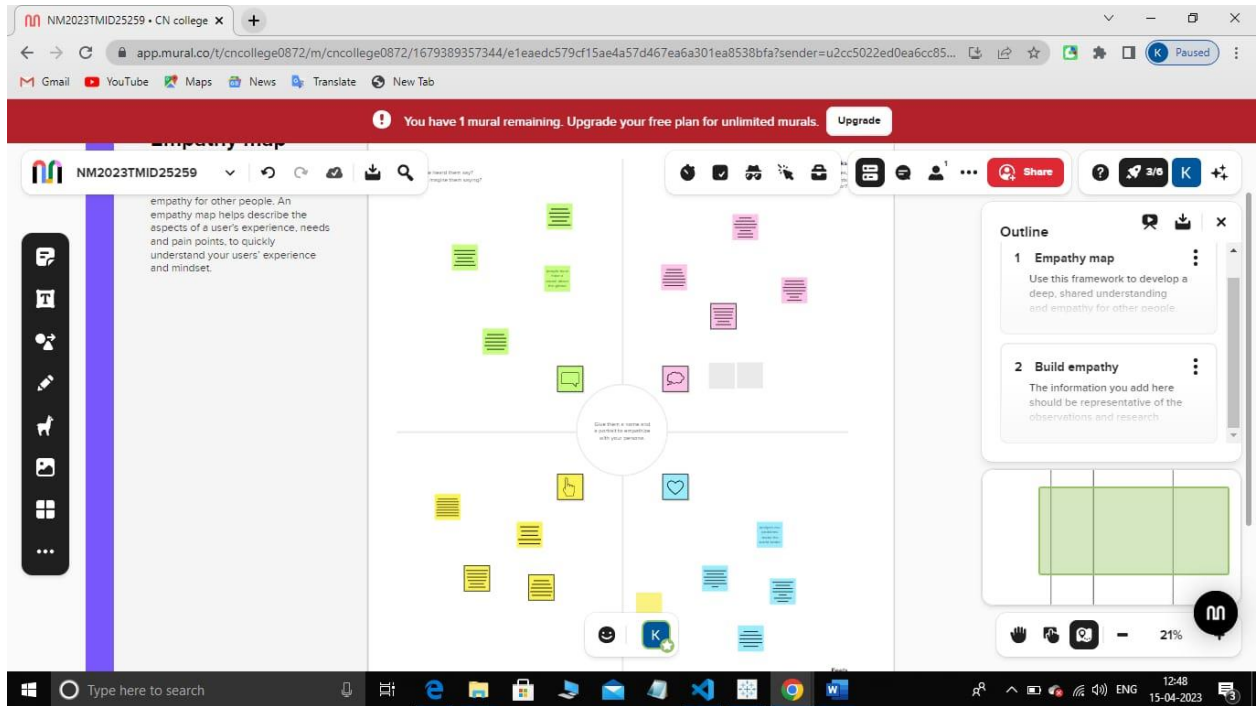
- **PURPOSE:**

The carbon (and oxygen) in CO₂ can be used as an alternative to fossil fuels in the production of chemicals, including plastics, fibres and synthetic rubber. As with CO₂-derived fuels, converting CO₂ to methanol and methane is the most technologically mature pathway. The methanol can be subsequently converted into other carbon-containing high-value chemical intermediates such as olefins, which are used to manufacture plastics, and aromatics, which are used in a range of sectors including health and hygiene, food production and processing.

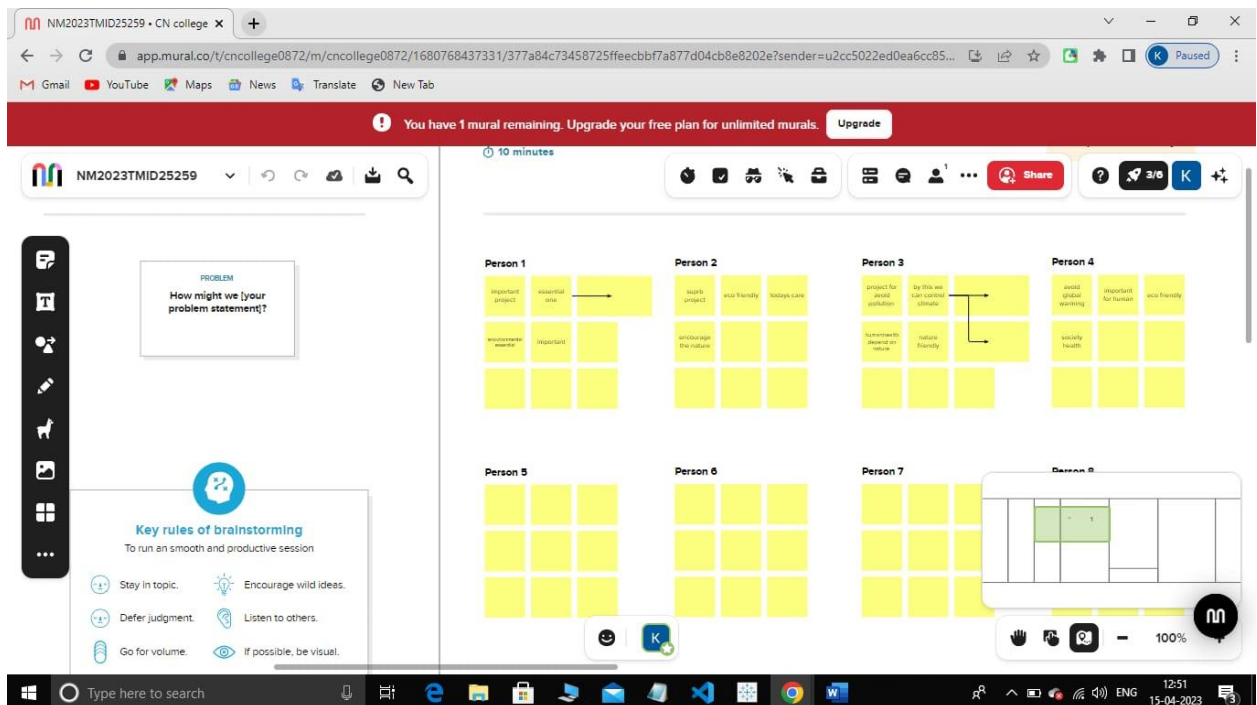
A special group of chemicals, polymers, are used in the production of plastics, foams and resins. The carbon in CO₂ can be used in polymer production by replacing part of the fossil fuel-based raw material in the manufacturing process. Unlike the conversion of CO₂ to fuels and chemical intermediates, polymer processing with CO₂ requires little energy input, because CO₂ is converted into a molecule with an even lower energy state (carbonate). A number of companies are currently operating polymer plants using CO₂ as a raw material.

2. PROBLEM DEFINITION& DESIGN THINKING:

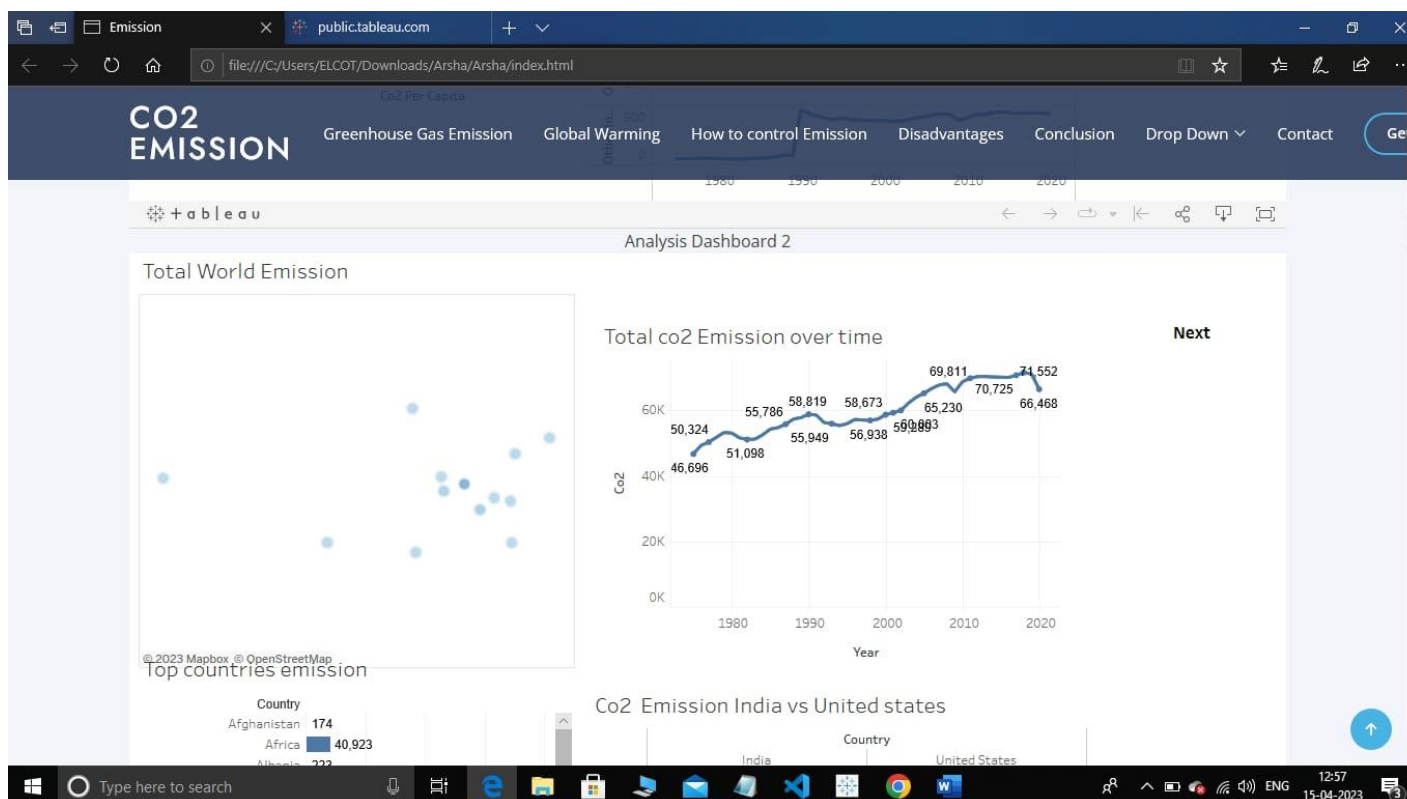
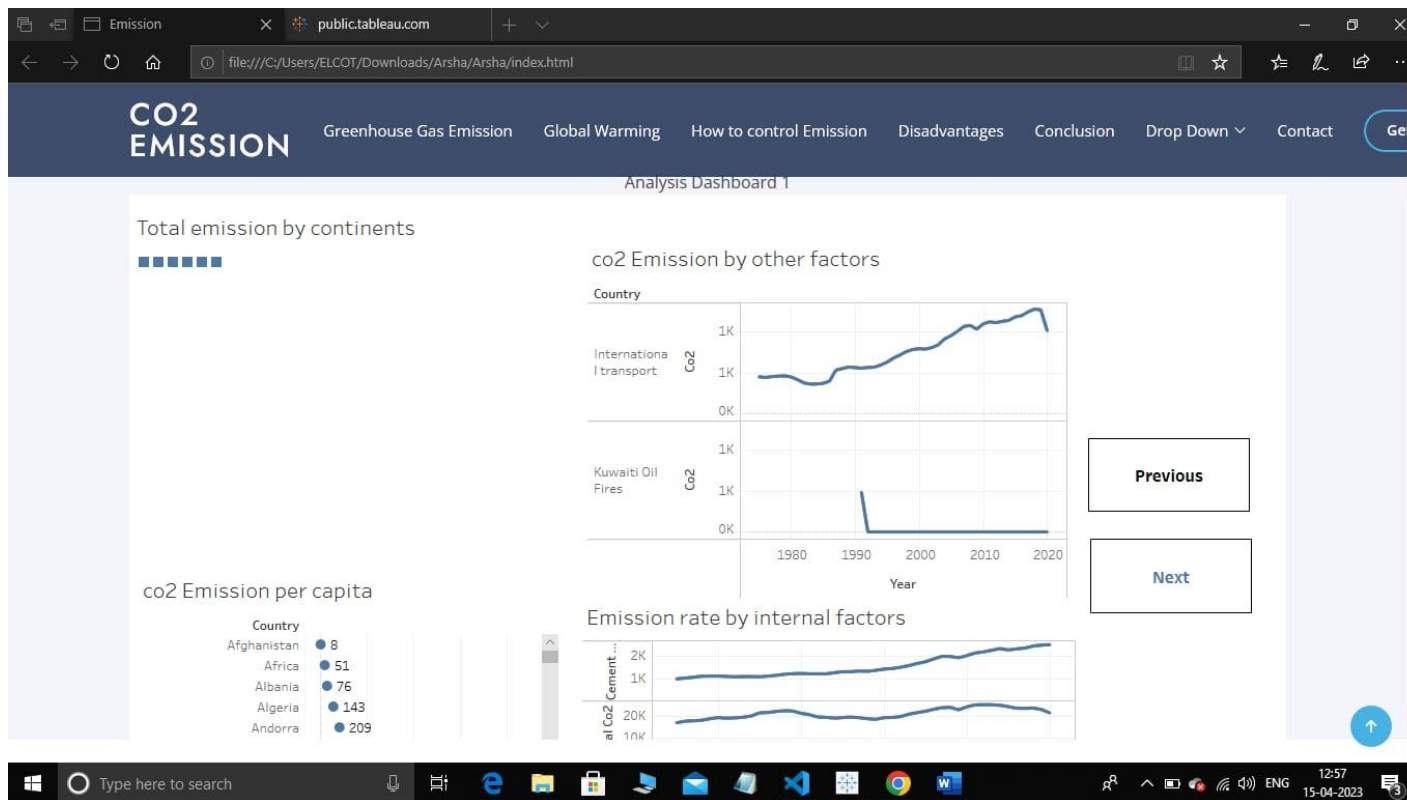
● EMPATHY MAP

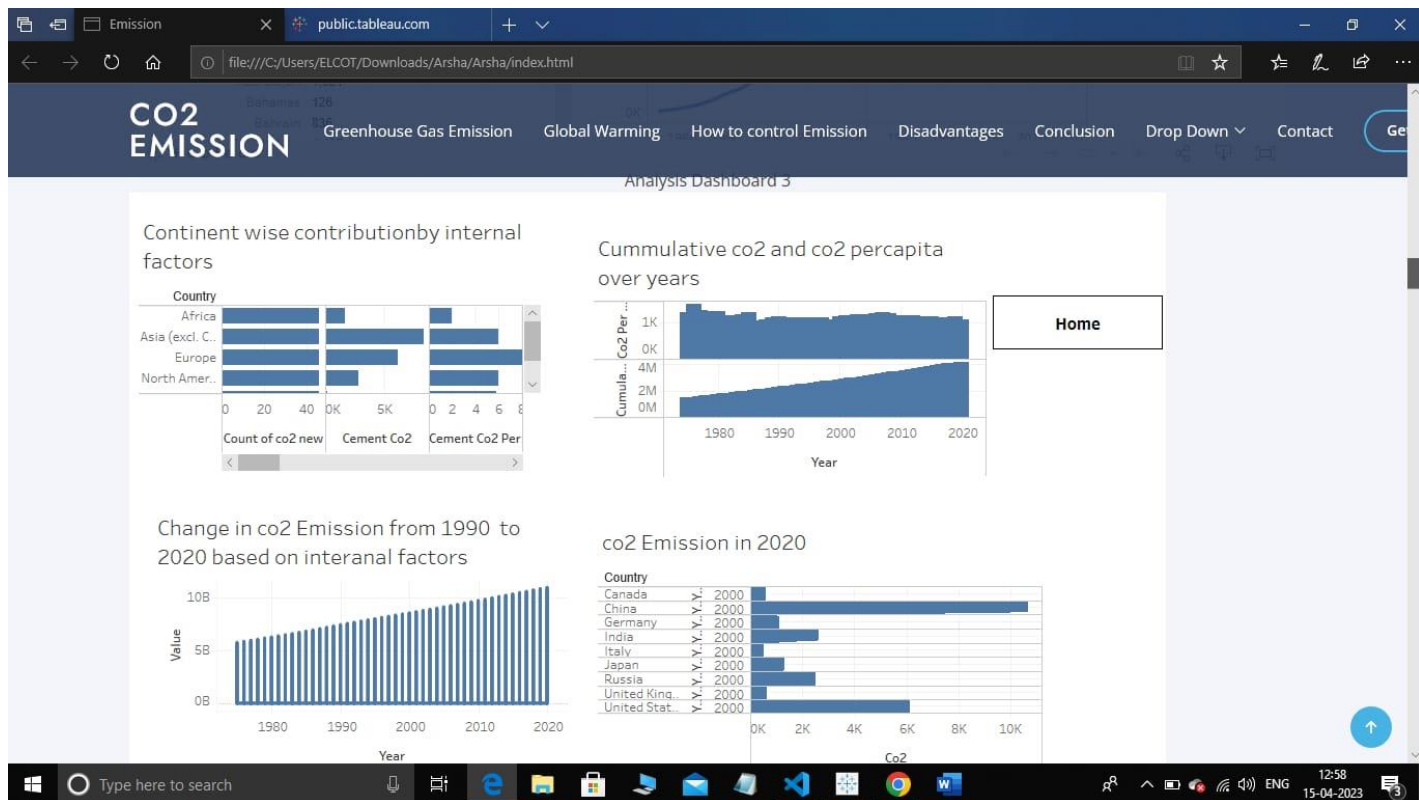


● IDEATION & BRAINTORMING MAP

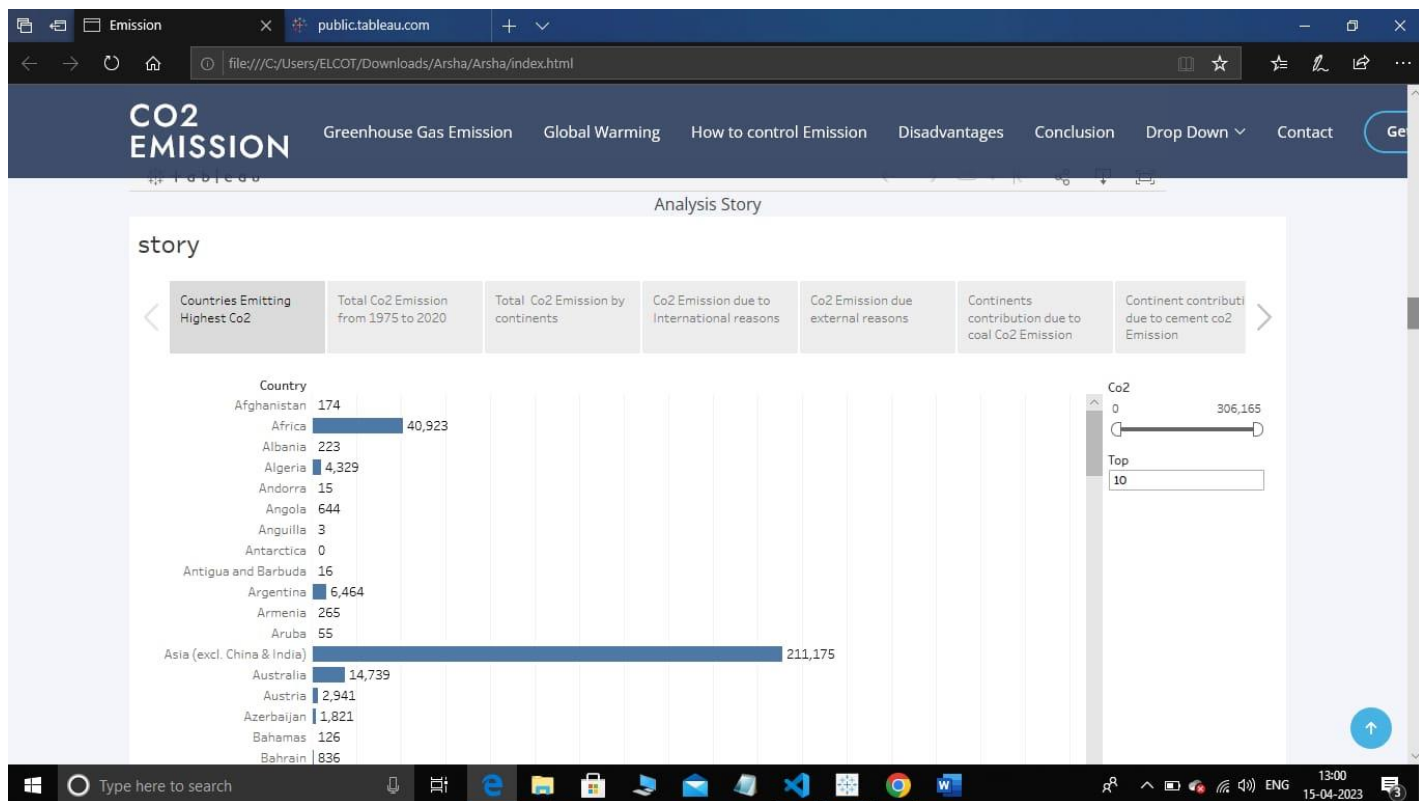


3.RESULT

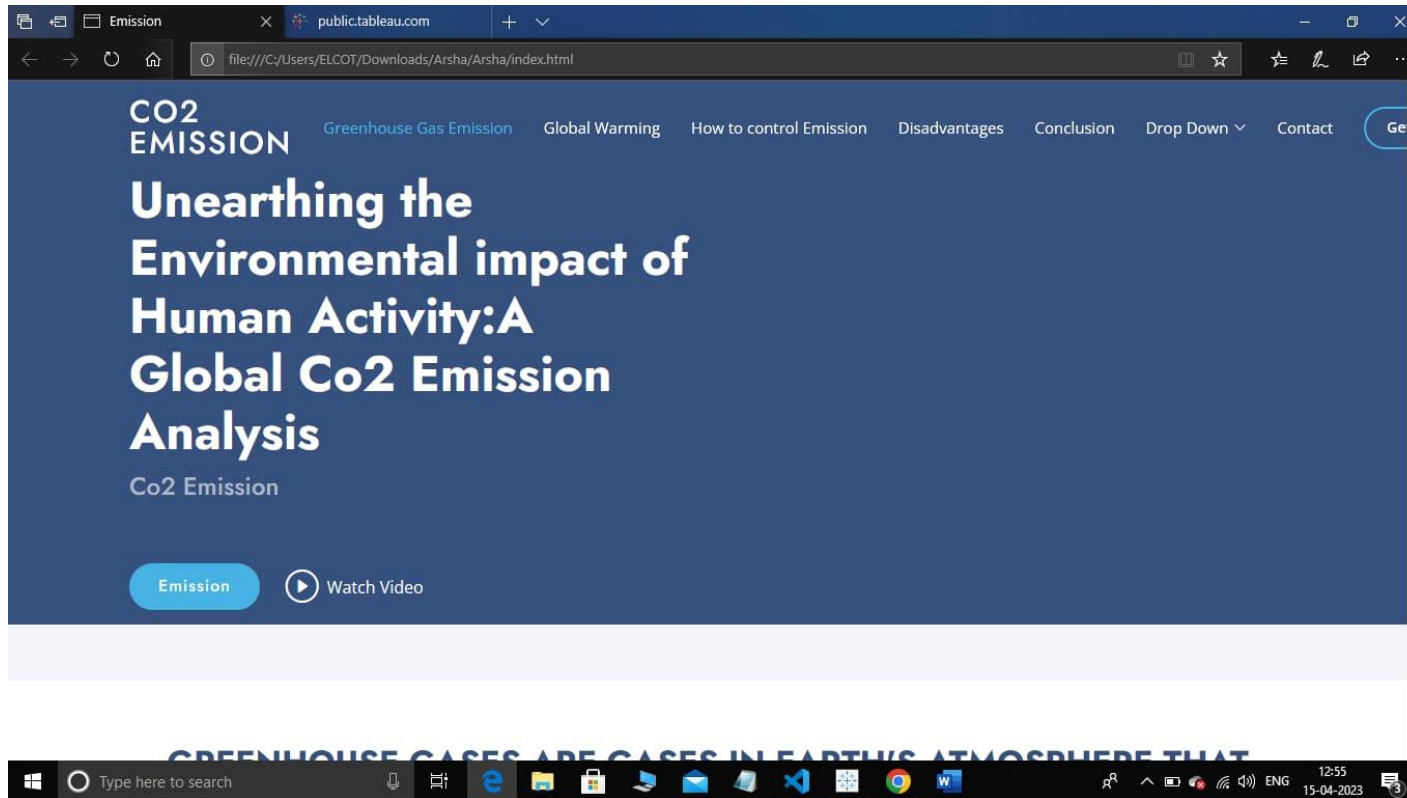




STORY



WEB INTEGRATION



- **DISADVANTAGES:**

Low CO₂ concentration affects the capture efficiency.

Temperature associated heat transfer problem and efficiency decay issues associated with the use of hydrogen-rich gas turbine fuel; high parasitic power requirement for sorbent regeneration; inadequate experience due to few gasification plants currently operated in the market; high capital and operating costs for current sorption systems; High efficiency drop and energy penalty; cryogenic O₂ production is costly; corrosion problem may arise.

Process is still under development and inadequate large scale operation experience.

3. APPLICATIONS:

1. CO₂-derived chemicals:

The carbon (and oxygen) in CO₂ can be used as an alternative to fossil fuels in the production of chemicals, including plastics, fibres and synthetic rubber. As with CO₂-derived fuels, converting CO₂ to methanol and methane is the most technologically mature pathway. The methanol can be subsequently converted into other carbon-containing high-value chemical intermediates such as olefins, which are used to manufacture plastics, and aromatics, which are used in a range of sectors including health and hygiene, food production and processing.

2. Building materials from minerals and CO₂:

CO₂ can be used in the production of building materials to replace water in concrete, called CO₂ curing, or as a raw material in its constituents (cement and construction aggregates). These applications involve the reaction of CO₂ with calcium or magnesium to form low-energy carbonate molecules, the form of carbon that makes up concrete (Figure 7). CO₂-cured concrete is one of the most mature and promising applications of CO₂ use,

while the integration of CO₂ in the production of cement itself is at an earlier stage of development.

3. Building materials from waste and CO₂:

Construction aggregates (small particulates used in building materials) can be produced by reacting CO₂ with waste materials from power plants or industrial processes. Among these are iron slag and coal fly ash, which would otherwise be stockpiled or stored in landfill (Figure 7). Producing building materials from waste and CO₂ can be competitive as it offsets the cost associated with conventional waste disposal.

4. CROP YIELD BOOSTING WITH CO₂:

CO₂ can be used to enhance yields of biological processes, such as algae production and crop cultivation in greenhouses. The application of CO₂ with low-temperature heat in industrial greenhouses is the most mature yield-boosting application today, and can increase yields by 25% to 30%. The clear leader in the use of CO₂ in greenhouses is the Netherlands, with an estimated annual consumption between 5 and

MtCO₂. Of this amount, approximately 500 ktCO₂ per year comes from external sources, mainly industrial plants, with the balance taken from on-site gas-fired boilers or co-generation systems. The replacement of these on-site systems with other industrial CO₂ sources or with CO₂ captured directly from the atmosphere could deliver climate benefits.

5. CONCLUSION:

The rising level of atmospheric CO₂ could be the one global natural resource that is progressively increasing food production and total biological output, in a world of otherwise diminishing natural resources of land, water, energy, minerals, and fertilizer. It is a means of inadvertently increasing the productivity of farming systems and other photo synthetically active ecosystems. The effects know no boundaries and both developing and developed countries are, and will be, sharing equally, for "the rising level of atmospheric CO₂ is a universally free premium, gaining in magnitude with time, on which we all can reckon for the foreseeable future"

The relationship described above by where data pertaining to atmospheric CO₂ emissions, food production, and human population are plotted. Standardized to a value of unity in 1961, each of these datasets has experienced rapid and interlinked growth over the past five decades. Rising global population has led to rising CO₂ emissions and rising CO₂ emissions have benefited food production.

The very real positive externality of inadvertent atmospheric CO₂ enrichment *must* be considered in all studies examining the SCC; and its observationally-deduced effects *must* be given premier weighting over the speculative negative externalities presumed to occur in computer model projections of global warming. Until that time, little if *any* weight should be placed on current SCC calculations.

6. FUTURE SCOPE:

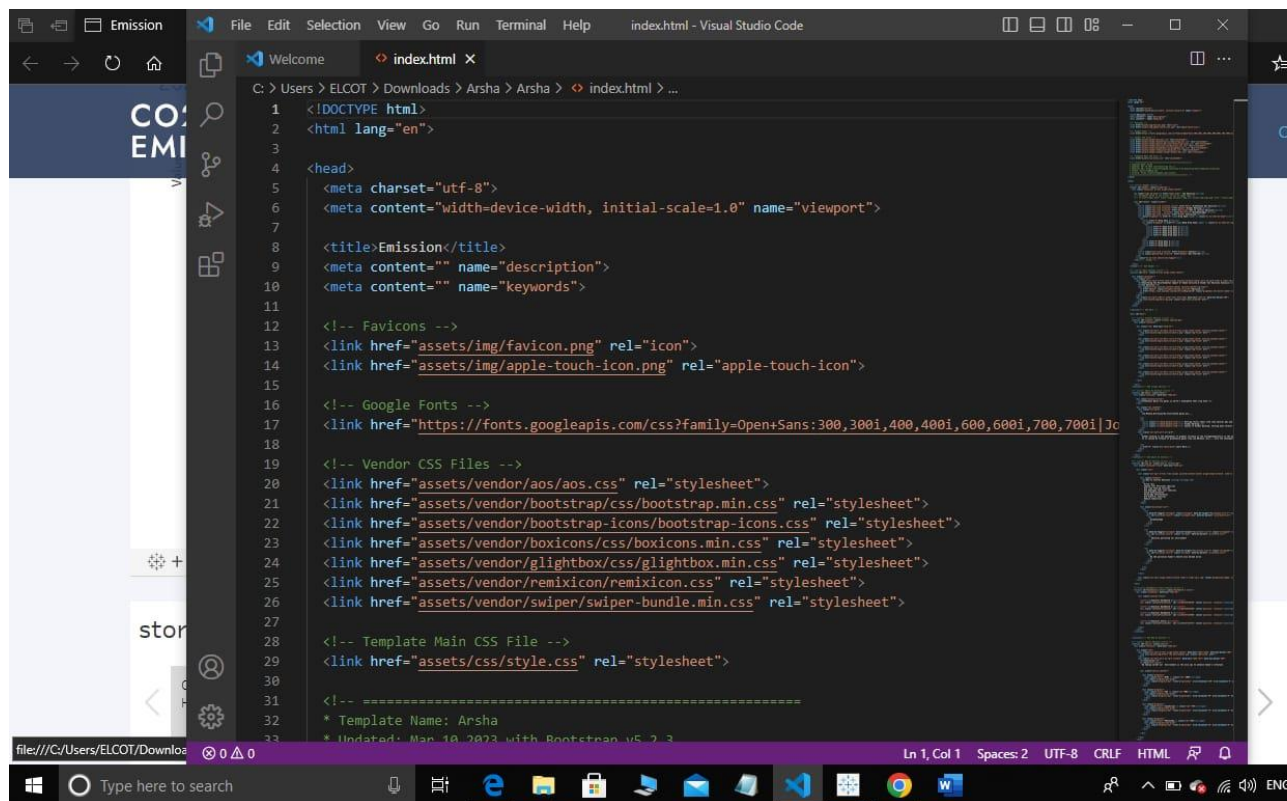
In the [*Annual Energy Outlook 2022*](#) (AEO2022) Reference case, which assumes no changes to current laws or regulations, the U.S. Energy Information Administration (EIA) projects that U.S. energy-related carbon dioxide (CO₂) emissions will fall to 4.5 billion metric tons in 2037, or 6% below the energy-related CO₂ emissions in 2021, before rising to 4.7 billion metric tons in 2050, or 2% below 2021 levels. Projected emissions decline from 2022 to 2037 primarily as a result of decreasing carbon intensity (CO₂ per unit of energy consumed) in the electric power sector. The rise in emissions from 2037 to 2050 is primarily due to increasing consumption. In the AEO2022 Reference case, U.S. energy consumption grows from 2021 through 2050 because of population growth of 0.4% per year and real economic growth of 2.2% per year. Over the projection period, increasing CO₂ emissions from natural gas and petroleum consumption growth will offset declines in CO₂ emissions from coal consumption.

World CO₂ emissions are projected to increase
EIA's [*International Energy Outlook 2021*](#) (IEO2021) Reference case projects that if current policy and technology trends continue, global energy consumption and energy-related CO₂ emissions will increase from 2020 through 2050 as a result of population and economic growth. However, projected future growth in energy-related CO₂ emissions is not evenly distributed

across the world, and the majority of the projected future growth in energy-related CO₂ emissions is among the group of countries outside the [Organization for Economic Cooperation and Development \(OECD\)](#).

7. APPENDIX:

- SOURCE CODE:



```
1 <!DOCTYPE html>
2 <html lang="en">
3
4 <head>
5   <meta charset="utf-8">
6   <meta content="width=device-width, initial-scale=1.0" name="viewport">
7
8   <title>Emission</title>
9   <meta content="" name="description">
10  <meta content="" name="keywords">
11
12  <!-- Favicons -->
13  <link href="assets/img/favicon.png" rel="icon">
14  <link href="assets/img/apple-touch-icon.png" rel="apple-touch-icon">
15
16  <!-- Google Fonts -->
17  <link href="https://fonts.googleapis.com/css?family=Open+Sans:300,300i,400,400i,600,600i,700,700i|Jc
18
19  <!-- Vendor CSS Files -->
20  <link href="assets/vendor/aos/aos.css" rel="stylesheet">
21  <link href="assets/vendor/bootstrap/css/bootstrap.min.css" rel="stylesheet">
22  <link href="assets/vendor/bootstrap-icons/bootstrap-icons.css" rel="stylesheet">
23  <link href="assets/vendor/boxicons/css/boxicons.min.css" rel="stylesheet">
24  <link href="assets/vendor/glightbox/css/glightbox.min.css" rel="stylesheet">
25  <link href="assets/vendor/remixicon/remixicon.css" rel="stylesheet">
26  <link href="assets/vendor/swiper/swiper-bundle.min.css" rel="stylesheet">
27
28  <!-- Template Main CSS File -->
29  <link href="assets/css/style.css" rel="stylesheet">
30
31  <!-- =====
32  * Template Name: Arsha
33  * Updated: Mar 10, 2022 with Bootstrap v5.2.2
```