1. INTRODUCTION

1.1 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.

1.2 PURPOSE

The global CO2 emissions and energy demand numbers are based on the IEA's detailed region-by-region and fuel-by-fuel analysis, drawing on the latest official national data and publicly available energy, economic and weather data. Combined with the methane emissions estimates published by the IEA and estimates of nitrous oxide and flaring related CO2 emissions, this new analysis shows that overall greenhouse gas emissions from energy rose to their highest ever level in 2021.

Emissions increased by almost 2.1 Gt from 2020 levels. This puts 2021 above 2010 as the largest ever year-on-year increase in energy-related CO_2 emissions in absolute terms. The rebound in 2021 more than reversed the pandemic-induced decline in emissions of 1.9 Gt experienced in 2020.

Coal accounted for over 40% of the overall growth in global CO_2 emissions in 2021. Coal emissions now stand at an all-time high of 15.3 Gt, surpassing their previous peak (seen in 2014) by almost 200 Mt. CO_2 emissions from natural gas also rebounded well above 2019 levels to 7.5 Gt, as demand increased in all sectors. At 10.7 Gt, emissions from oil remained significantly below pre-pandemic levels because of the limited recovery in global transport activity in 2021.

CO_2 emissions in India rebounded strongly in 2021 to rise 80 Mt above 2019 levels, led by growth in coal use for electricity generation. Coal-fired generation reached an all-time high in India, jumping 13% above the level in 2020 when coal generation had declined by 3.7%. This was in part because the growth of renewable slowed to one-third of its average rate of the previous five years.

Across advanced economies overall, structural changes such as increased uptake of renewables, electrification and energy efficiency improvements avoided an additional 100 Mt of CO_2 emissions in 2021 compared with 2020.

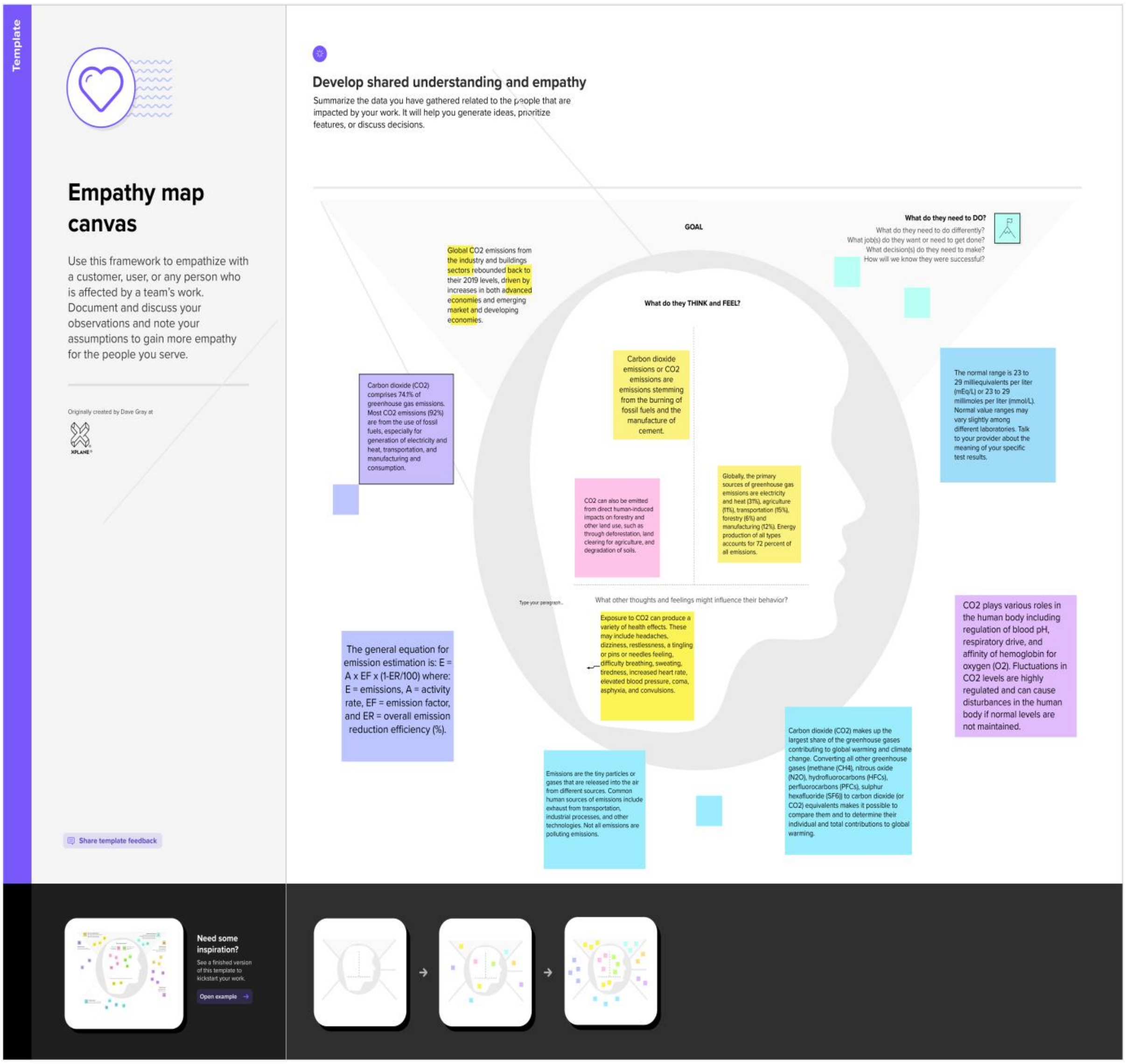
CO_2 emissions include emissions from all uses of fossil fuels for energy purposes, including emissions from the combustion of non-renewable waste. The scope of emissions covered in this year's Global Energy Review has been expanded to also include CO_2 emissions from industrial processes such as cement, iron and steel, and chemicals production. Estimates of industrial process emissions draw upon the latest statistical data on clinker production for cement and steel production, and relevant chemicals data. CO_2 emissions from the combustion of flared gases are also included for the first time.

Non-CO_2 greenhouse gas emissions included within the scope of the Global Energy Review for the first time this year include fugitive methane emissions from oil, gas and coal supply. Methane and nitrous oxide emissions related to energy combustion are also evaluated, based on typical emissions factors for given end-uses and regions. When converting non-CO_2 greenhouse gas emissions to CO_2 equivalent quantities, a global warming potential over a 100-year period is used, with global warming potential values of 30 for methane, and 273 for nitrous oxide.

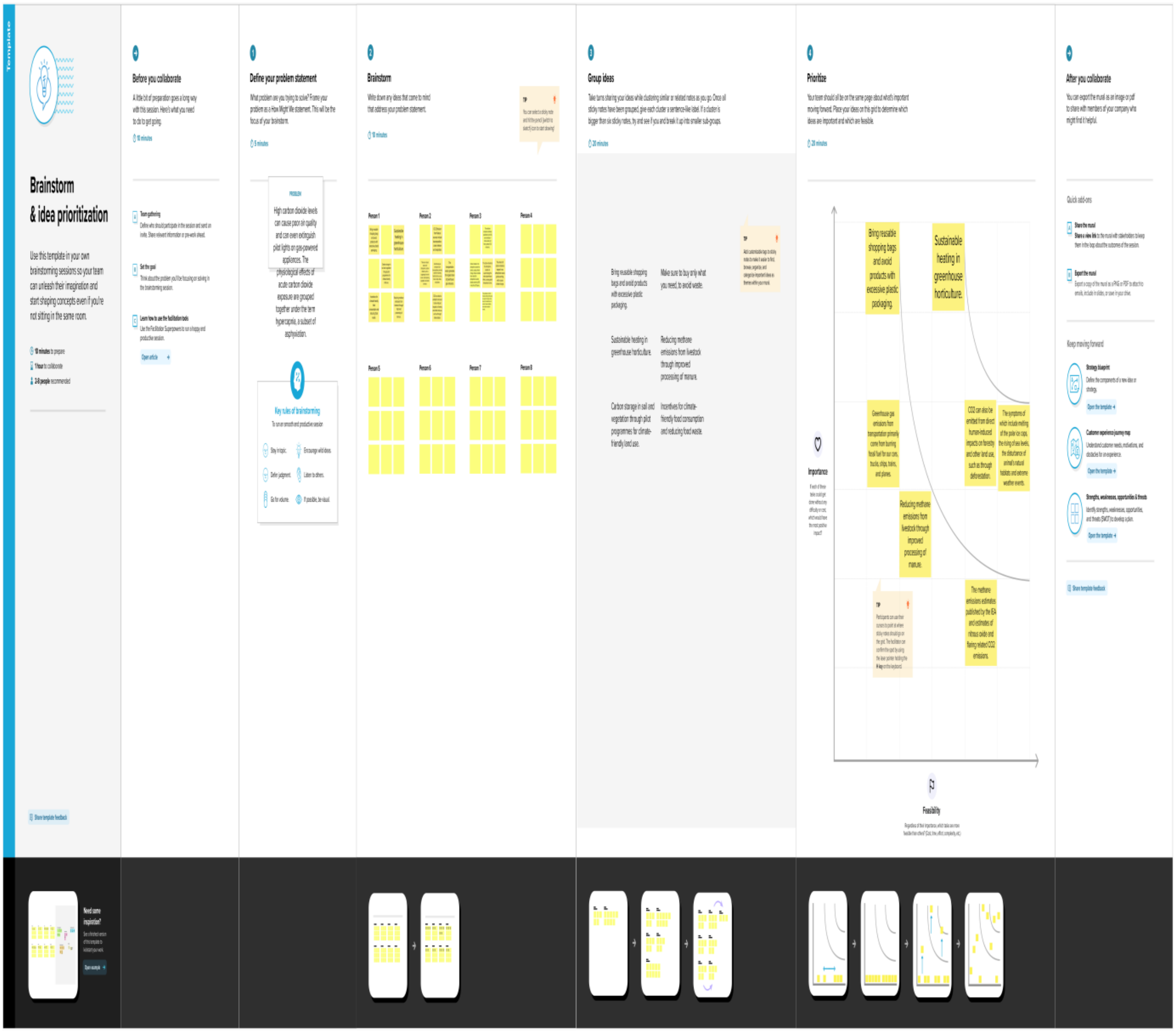
Economic growth rates used for this analysis are those of the International Monetary Fund's January 2022 update to the World Economic Outlook. All monetary quantities are expressed in USD2020, in PPP terms.

2. PROBLEM DEFINITION AND DESIGN THINKING

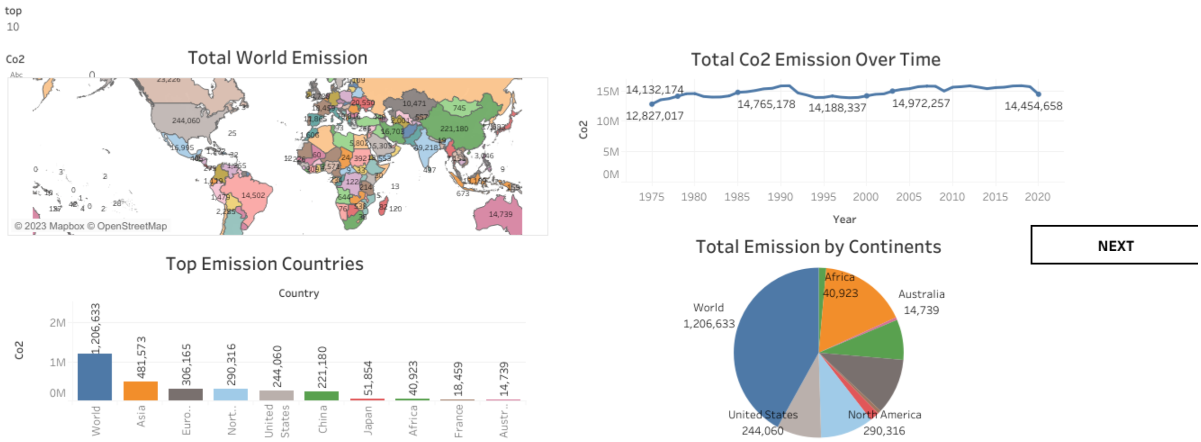
2.1 EMPATHY MAP

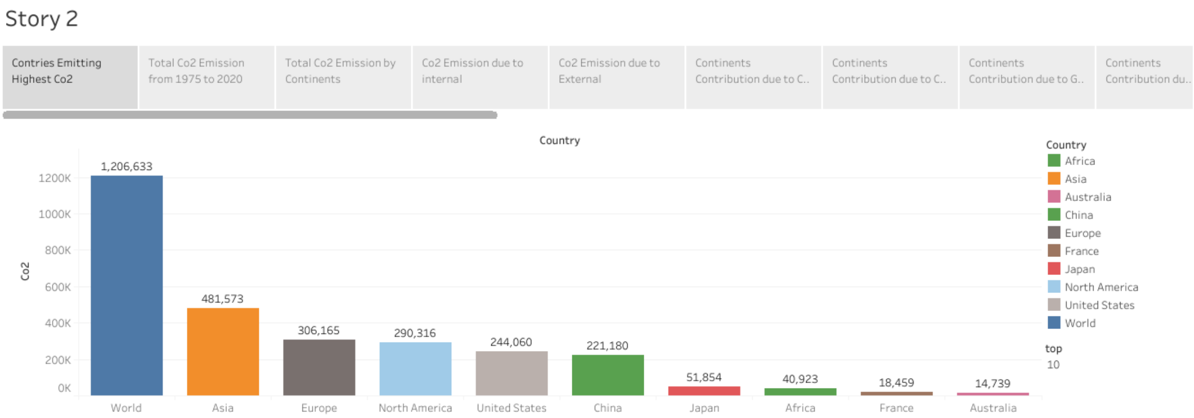


2.2 IDEATION AND BRAINSTROMING MAP



3. RESULT





4. ADVANTAGES AND DISADVANTAGES OF CO2 EMISSION

4.1 ADVANTAGES

- The earth's atmosphere is approximately 0.039% carbon dioxide.
- Plants are especially reliant on CO2, as they use it to get energy. Plants perform a chemical reaction known as photosynthesis which requires carbon dioxide.
- Higher carbon-di-oxide level will be beneficial which will boost agricultural productivity and improve drought resistance, thereby bolstering food security and contributing to a greener, lusher planet.

4.2 DISADVANTAGES

- Another threat that CO2 poses comes in the form of global warming. Carbon emissions (partly due to the burning of fossil fuels) are causing a gap in our ozone layer.
- The ozone layer is a 'film' around the earth that protects our planet from harmful rays coming from the sun. When holes appear in this layer, harmful rays enter the earth's atmosphere and raise the temperature of the planet.
- Carbon dioxide in the atmosphere warms the planet, causing climate change. Human activities have raised the atmosphere's carbon dioxide content by 50% in less than 200 years.
- High carbon dioxide levels can cause **poor air quality** and can even extinguish pilot lights on gas-powered appliances.
- The physiological effects of acute carbon dioxide exposure are grouped together under the term hypercapnia, a subset of asphyxiation.

5. APPLICATIONS OF CO2 EMISSION

Carbon dioxide is used as a refrigerant, in fire extinguishers, for inflating life rafts and life jackets, blasting coal, foaming rubber and plastics, promoting the growth of plants in greenhouses, immobilizing animals before slaughter, and in carbonated beverages**.**

1.CO2-derived fuels

The carbon in CO_2 can be used to produce fuels that are in use today, including methane, methanol, gasoline and aviation fuel.

2. CO2-derived chemicals

The carbon (and oxygen) in CO_2 can be used as an alternative to fossil fuels in the production of chemicals, including plastics, fibres and synthetic rubber. As with CO_2-derived fuels, converting CO_2 to methanol and methane is the most technologically mature pathway.

3. Building materials from minerals and CO2

CO_2 can be used in the production of building materials to replace water in concrete, called CO_2 curing, or as a raw material in its constituents (cement and construction aggregates).

4. Building materials from waste and CO2

Construction aggregates (small particulates used in building materials) can be produced by reacting CO_2 with waste materials from power plants or industrial processes. Waste materials such as steel slag, bauxite residue and air pollution control (APC) residues are good candidates for conversion into building materials using CO_2.

6. 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.

The world must now ensure that the global rebound in emissions in 2021 was a one-off – and that sustainable investments combined with the accelerated deployment of clean energy technologies will reduce CO_2 emissions in 2022, keeping alive the possibility of reducing global CO_2 emissions to net zero by 2050.

The regional climate changes, especially temperature increases, are impacting natural systems across the world and that these temperature increases are most likely to be the result of anthropogenic greenhouse gas emissions.

7. FUTURE SCOPE

Smart grids can collect and coordinate data from generators, system operators, end users and electricity market stakeholders to operate power systems more efficiently, minimizing costs and environmental impacts while maximizing reliability, resilience and stability.

Digitalized energy systems in the future may be able to identify who needs energy when and deliver it at the right time, in the right place and at the lowest cost, such as choosing to recharge electric vehicles either when demand elsewhere is low, or when renewables are operating at surplus output.

But digitalization also raises new security and privacy risks. Integrating diffused and decentralized renewable generation creates new entry points for cyber attacks.

Some chemicals require carbon to provide their structure and properties while carbon-based fuels may continue to be needed where direct use of electricity or hydrogen is challenging (for example, in aviation). In the transition to a net-zero CO_2 emission economy, the CO_2 would increasingly have to be sourced from biomass or the air.

The level of CO_2 in the atmosphere has risen from around 317 ppm in 1958 (when Charles David Keeling began making his historical measurements at Mauna Loa) to 400 ppm today. It's projected to reach 450 ppm by the year 2040. Based on a business-as-usual trend, global carbon dioxide emissions are forecast to increase to some 43.08 billion metric tons in 2050, in comparison to 35.3 billion metric tons of carbon dioxide in 2018.