



BA GAMES DESIGN, BA ANIMATION & VFX

Contemporary Challenges: Making A Difference
ACCA4027

Research Report & Poster

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Report

Introduction

In this report I will be addressing the enormous environmental issue that is climate change. Specifically, the production of greenhouse gas emissions, mainly carbon dioxide. I will be going over the challenges we are facing, the leading cause and effect of carbon emissions, as well as potential solutions.

The Challenge

The challenge I will be looking into will be the main cause and effects of high carbon emissions in the atmosphere. This is a difficult topic to discuss as there isn't an outright correct and absolute solution to this problem, however saying that does not mean we can simply ignore the issue. If we continue at the rate we are going our climate will begin to change drastically, as an article in GreenMatters comments:

Perhaps the most important way that carbon emissions affect the planet is by causing climate change. As the average global temperature warms, our climate inherently changes — it warms. This warming causes extreme weather events like tropical storms, wildfires, severe droughts and heat waves. The same problem holds for animals, as well; as climate change alters our environment and natural habitats, different indigenous species take a hit. Some species may disappear altogether, while others might thrive and overtake others [1].

Causes

What are the main causes of greenhouse gas emissions? A quote from a post by Our World in Data asks the right question:

To effectively reduce emissions, we need to know where they come from – which sectors contribute the most? How can we use this understanding to develop effective solutions and mitigation strategies?[2].

Carbon dioxide is the most dangerous and prevalent greenhouse gas there is, these gases are being released into the atmosphere mainly due to the burning of fossil fuels.

There are numerous ways in which we are globally contributing to carbon dioxide emissions, these graphs below clearly indicate how Electricity and heat are the leading factors, see figure 1.

CO₂ emissions by sector, World

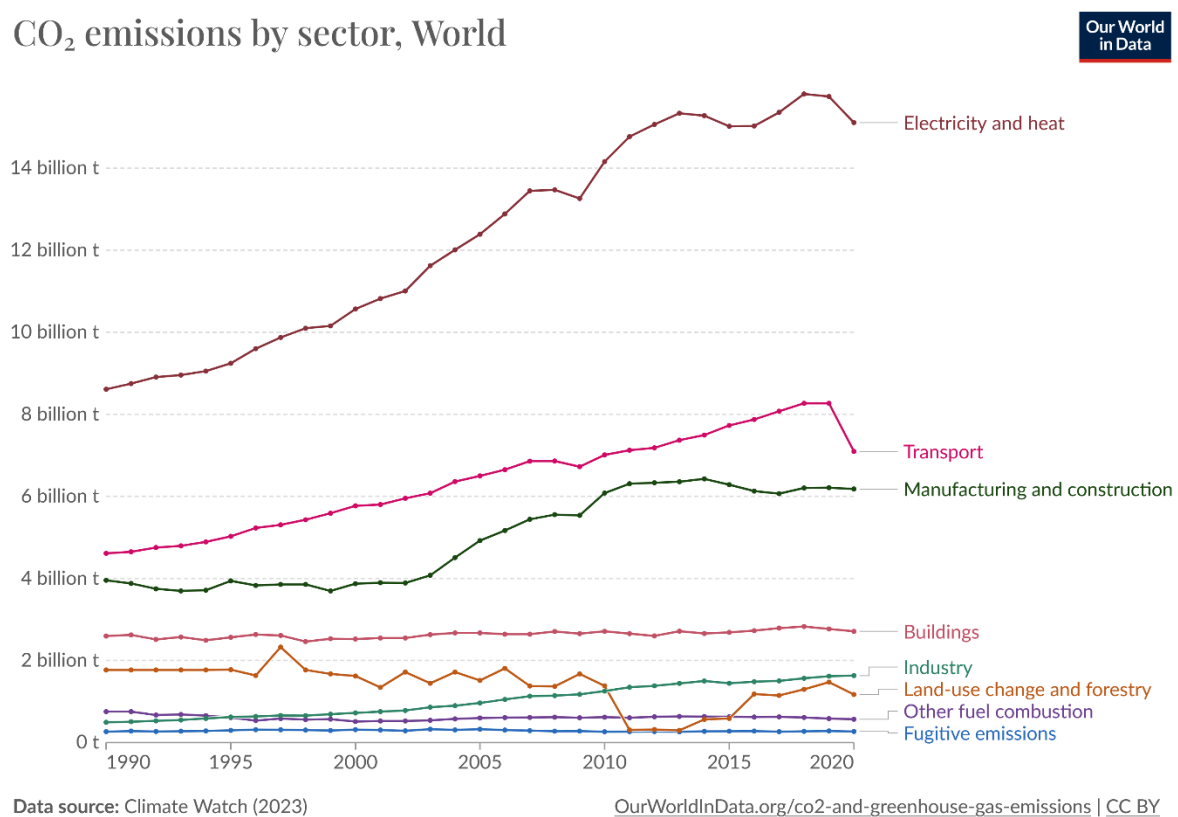
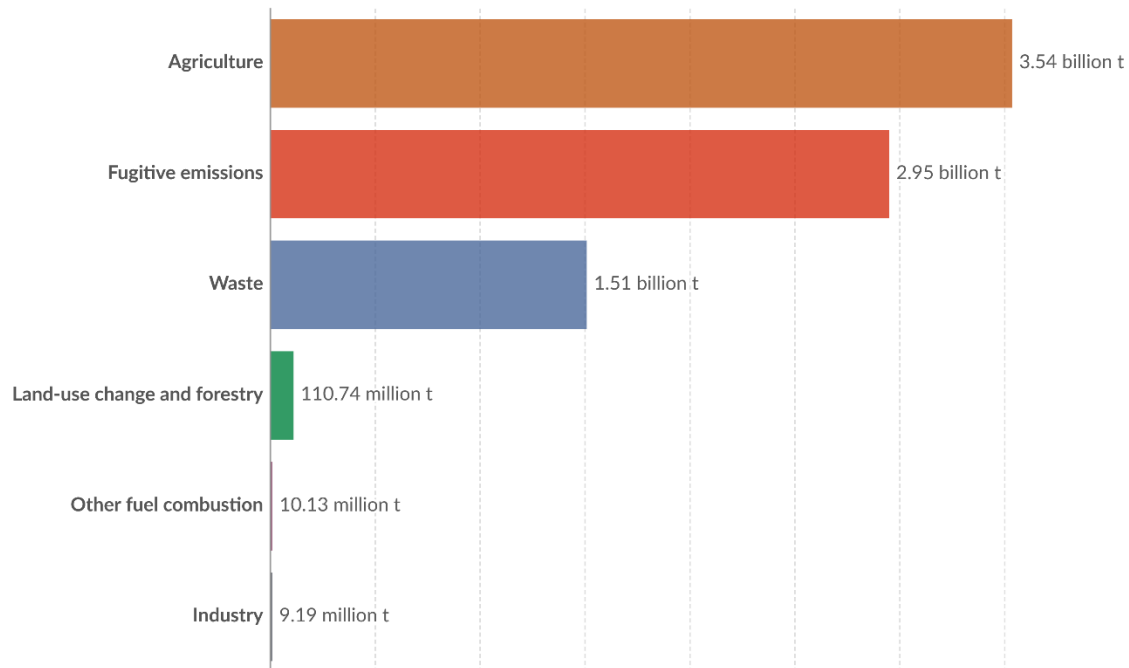


Fig. 1. Graph of CO₂ emissions by sector for the world. [2]

Carbon dioxide is not the only gas affecting our atmosphere however, Methane gas is also a large factor contributing to climate change with its own causes. Notably from agricultural production – being the meat that you and I consume on a daily basis. See figure 2.

Methane emissions by sector, World, 2020

Methane (CH₄) emissions are measured in tonnes of carbon dioxide-equivalents¹.



Data source: Climate Watch (2023)

OurWorldInData.org/co2-and-greenhouse-gas-emissions | CC BY

1. Carbon dioxide equivalents (CO₂eq): Carbon dioxide is the most important greenhouse gas, but not the only one. To capture all greenhouse gas emissions, researchers express them in "carbon dioxide equivalents" (CO₂eq). This takes all greenhouse gases into account, not just CO₂. To express all greenhouse gases in carbon dioxide equivalents (CO₂eq), each one is weighted by its global warming potential (GWP) value. GWP measures the amount of warming a gas creates compared to CO₂. CO₂ is given a GWP value of one. If a gas had a GWP of 10 then one kilogram of that gas would generate ten times the warming effect as one kilogram of CO₂. Carbon dioxide equivalents are calculated for each gas by multiplying the mass of emissions of a specific greenhouse gas by its GWP factor. This warming can be stated over different timescales. To calculate CO₂eq over 100 years, we'd multiply each gas by its GWP over a 100-year timescale (GWP100). Total greenhouse gas emissions – measured in CO₂eq – are then calculated by summing each gas' CO₂eq value.

Fig. 2. Methane emissions by sector, World, 2020. [2]

Effects

An article from the World Economic Forum had this to say:

While an exact figure is still not possible, low levels of warming are now found to be far less likely than previously thought. Very high carbon dioxide levels are slightly less likely too. There is much greater certainty that, if left unchecked, global warming would be high enough to bring very severe impacts and risks worldwide [3].

The rising release of these gasses into the atmosphere are having an adverse effect on the global temperature, rising every year since the industrialization of our world. These gases are trapping in solar flares/energy instead of letting it reflect off the earth and back into space, this is what is known as the greenhouse effect.

The effects of rising carbon emissions are generally hurtful, however a NASA study [4] on the growth of crops would suggest that rising carbon emissions can increase the yield of certain crops by up to 90%.

Potential Solutions

Aside from the alternate form of power production, solar, wind, tidal etc. There are several ways in which we as humans can reduce the amount of greenhouse gasses being released into the atmosphere. Albeit none of these solutions are easy and an immediate fix.

An article written by SKY News [5] suggests seven ways in which we can attempt to tackle the rise in greenhouse gasses, to name a few:

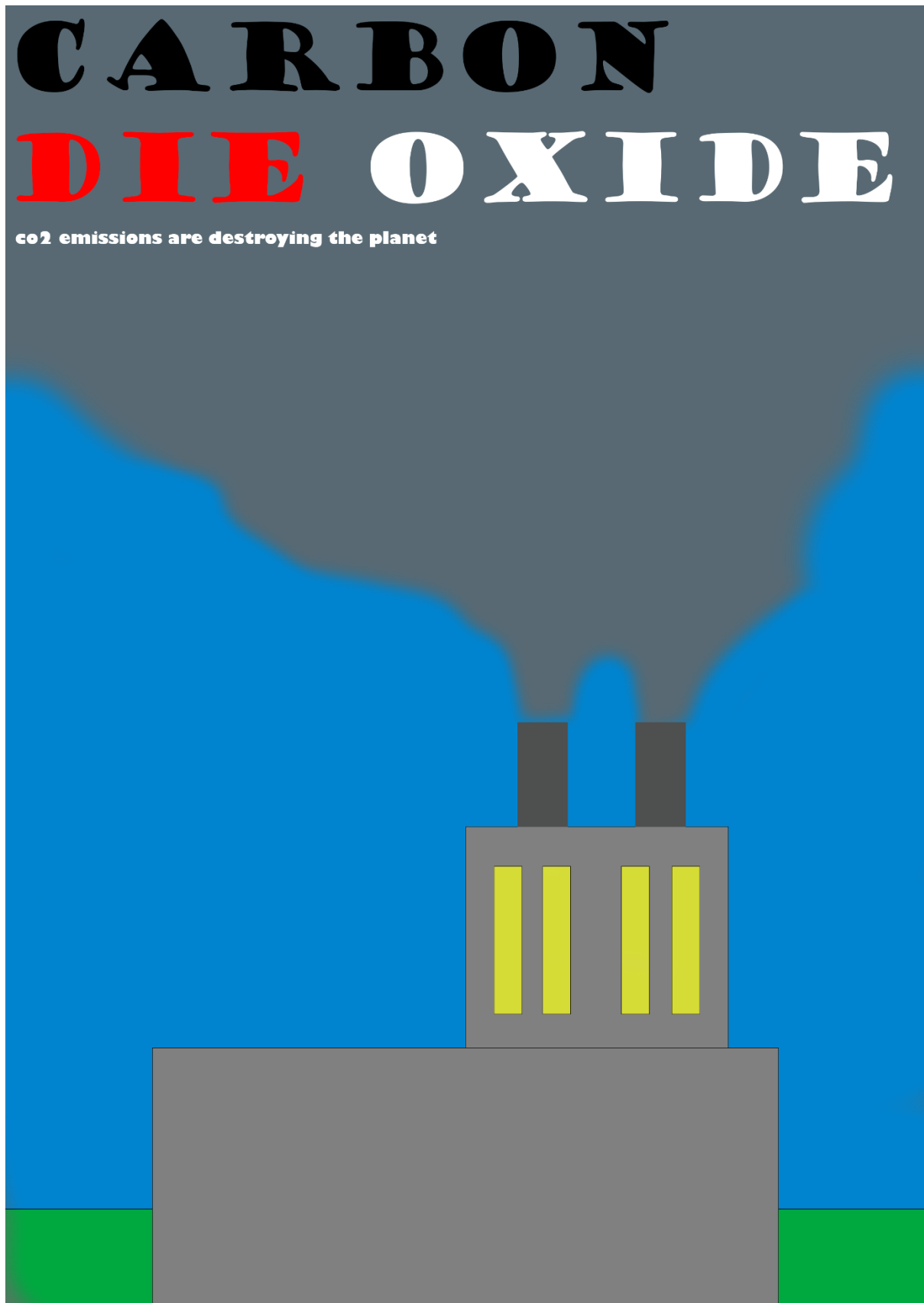
1. Carbon capture – This method would entail CO₂ being produced from industrial processes piping the gasses to an underground storage facility deep below the North Sea where it will not affect the atmosphere and eventually be transformed into new fuels in the future.
2. Climate repair – The University of Cambridge is investigating into ways we can repair the damage that has been done to the climate already. Such as refreezing the poles by brightening the clouds above them. Another suggestion is to fertilise the oceans, promoting the growth of algae which will absorb a share of CO₂.
3. Remote working – A simple solution that doesn't seem like it would have the biggest impact, however transportation is a large contributor to CO₂ emissions, allowing people to work remotely from their homes would see a significant reduction in carbon emissions. However, this solution has an adverse effect in the winter months with the article stating:

It turns out that when buildings need to be heated during the winter it is much more efficient to have numerous people in a single building rather than distributed across their own homes, and some research suggests this might even offset the emissions from transportation [5].

Summary

To conclude, there is no easy, simple solution to reducing emissions. We cannot just flick a switch and turn off all our air pollution. It is a complex problem that requires a complex solution. Many of the solutions presented above are expensive, time-consuming tasks that need to be happening right now if we have any chance in slowing the increasing temperature of the planet. Having said that not all hope is lost and every little thing we are doing now is a step in the right direction.

Poster



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