INTERNATIONAL UNIVERSITY

VNU-HCM

Data Science and Data Visualization

GROUP PROJECT REPORT

Topic: Can WE Fix Climate Change?

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I. Introduction:

Global warming or climate change is one of the most significant problems that people around the world must face with. While there are some people who turn a blind eye on this problem, the others are of the opinion that governments together with the citizens and companies should take some actions to slow down the changes in the global temperature and save the climate. The world is changing with the development of new technologies. In this project, we will focus on the visualization of all the changes and events on global climates to deliver some messages that help people gain more knowledge about the current climate and persuade them to take actions to fix the climate. This is the reason why we choose 'Can WE Fix Climate Change?' as the main topic of our project.

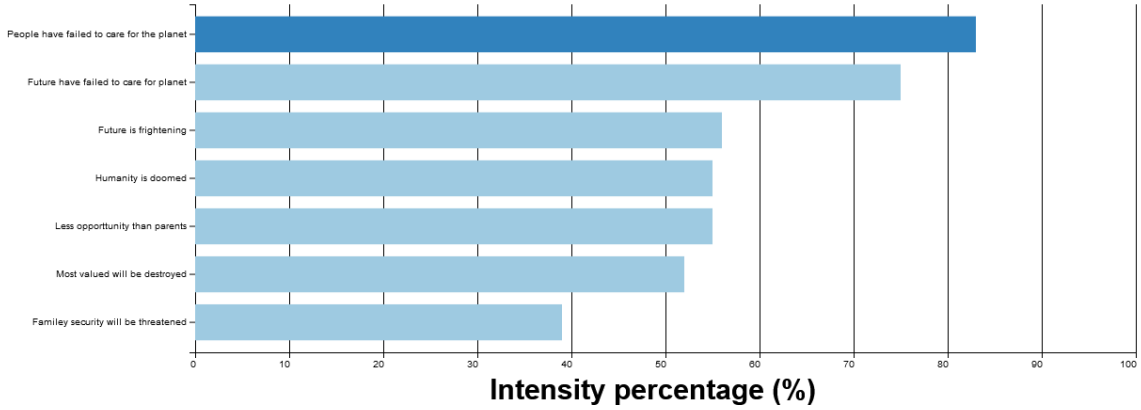
II. Do we care about climate change?

While researchers and environmentalists said that be friendly with the environment is such a nice idea, many people in today society believe that we could not do anything when we are starving. Many people are of the opinion that if we want to survive and growth, we must pollute. But when we have gained enough money or more than that, we should be seriously pay an attention about this problem right? Or we may death before becoming wealthy? How many of people on the world today actually care about the threaten of the climate change? The following research together with some visualization graphs will help us understand more about the impacts of global warming and why we should act now to manage this difficult situation.

1. The negative beliefs of people about climate change:

Percentage (%) of whole sample reporting specific negative beliefs about climate change

Thoughts about climatte change	All countries
People have failed to care for the planet	83
Future have failed to care for planet	75
Future is frightening	56
Humanity is doomed	55
Less opporttunity than parents	55
Most valued will be destroyed	52
Familey security will be threatened	39



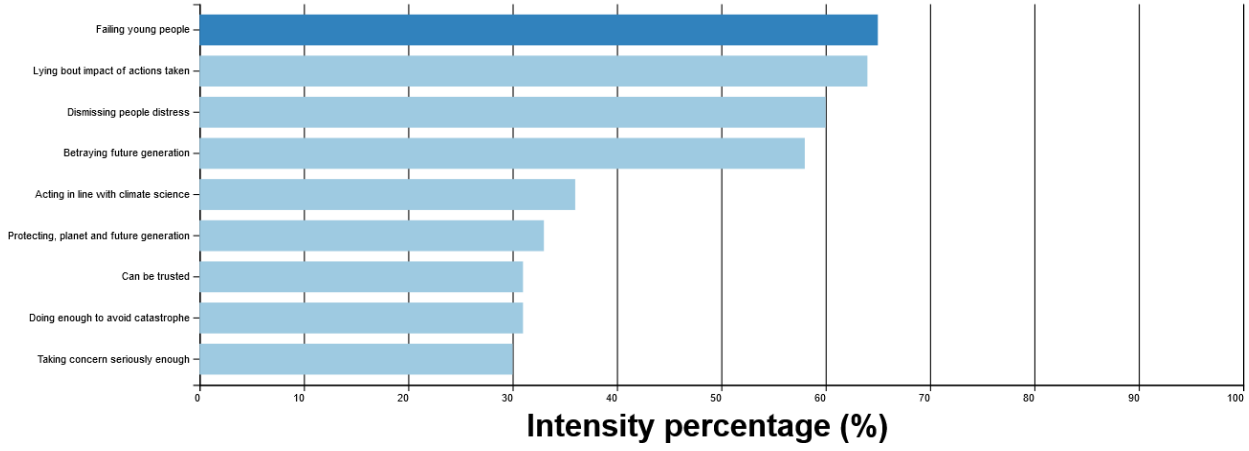
The percentages of people negative thoughts about climate change

As you can see from the given horizontal bar chart and table, most people (83%) think that human have fail to take care to the planet when we let the climate change occur quickly. In addition, three quarters (75%) of people on the world believe that, in the future, they cannot take care for the climate. And many opinionsrelated to this situation also have a high rating.

2. The specific emotions in relation to climate change:

Percentage (%) of whole sample reporting specific emotions in relation to climate change

Thought about government reponse	All countries
Failing young people	65
Lying bout impact of actions taken	64
Dismissing people distress	60
Betraying future generation	58
Acting in line with climate science	36
Protecting, planet and future generation	33
Can be trusted	31
Doing enough to avoid catastrophe	31
Taking concern seriously enough	30



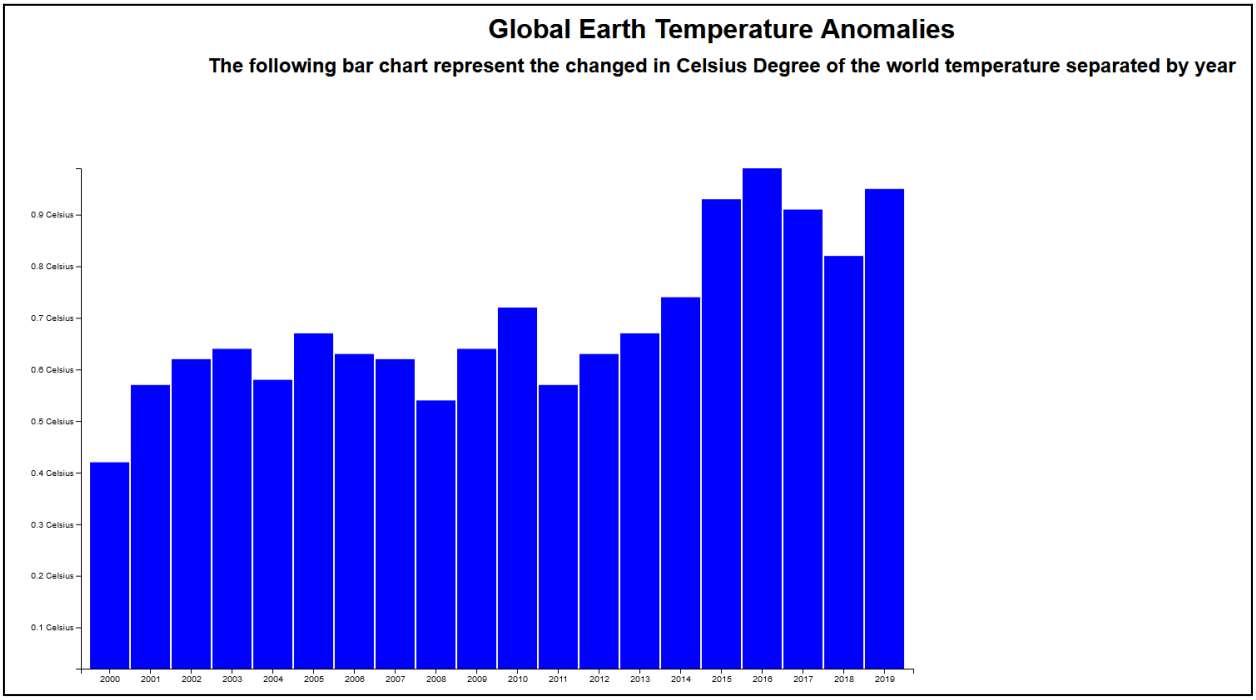
The percentages of people negative thoughts about climate change

Many people have a negative emotion about this problem and many of them are trying to avoid taking action to fix the climate for many reasons. Some people think that they will fail young people. Some people believe there are several impacts if they are taking some actions to save the climate. Only a little proportion of people want to do somethings to fix this situation. The reason of this is because many people think that when saving the climate, there current life will be affected. They may gain less convenient, pay more money on the renewable and green sources of energy, and so on.

III. Global temperature and disaster frequency:

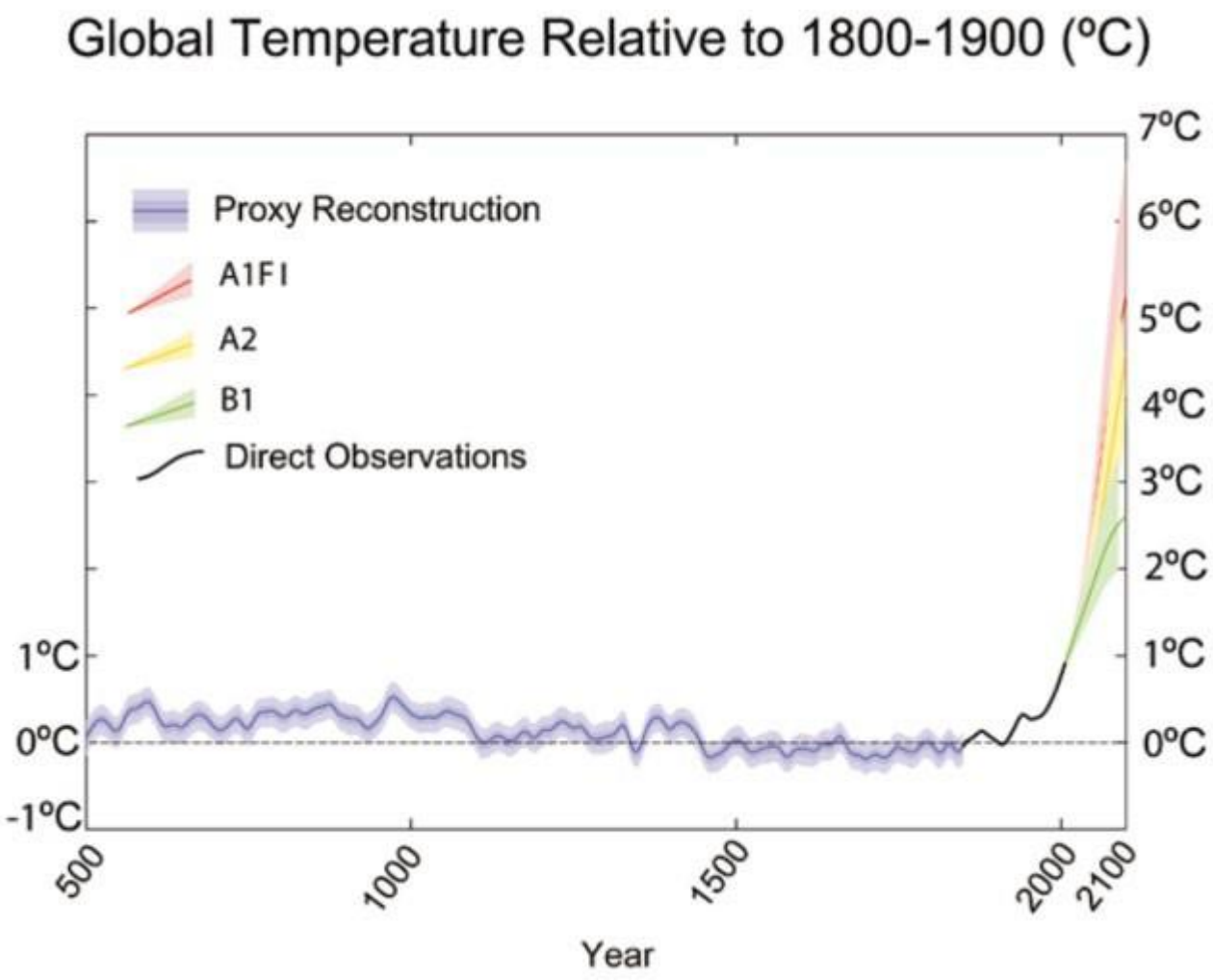
1. The rise of global temperature and heat waves:

In recent years, global temperature has increased slightly. This trend continuous to increase every year. The given visualization will help us to understandthis situation easier.



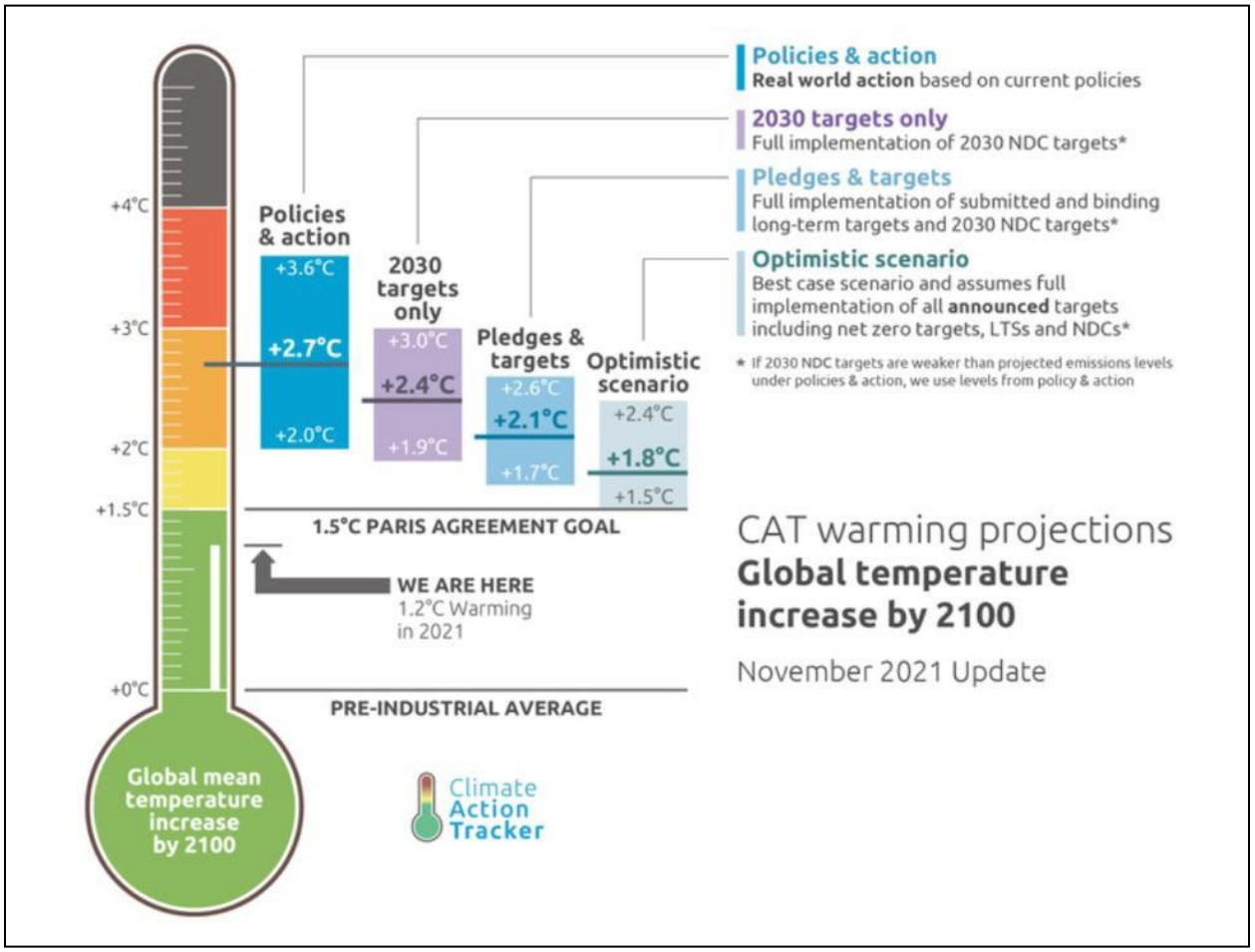
The change in global temperature from 2000 to 2019

As in the bar chart, the earth's temperature has growth for at least 0.42 Celsius every year. In 2016, this has risen for nearly 0.95 Celsius. Furthermore, it is predicted that from 2021 to 2040, the temperature of Earth will rise in a range of 1.2 Celsius to 1.5 Celsius every year:



Global Temperature Prediction

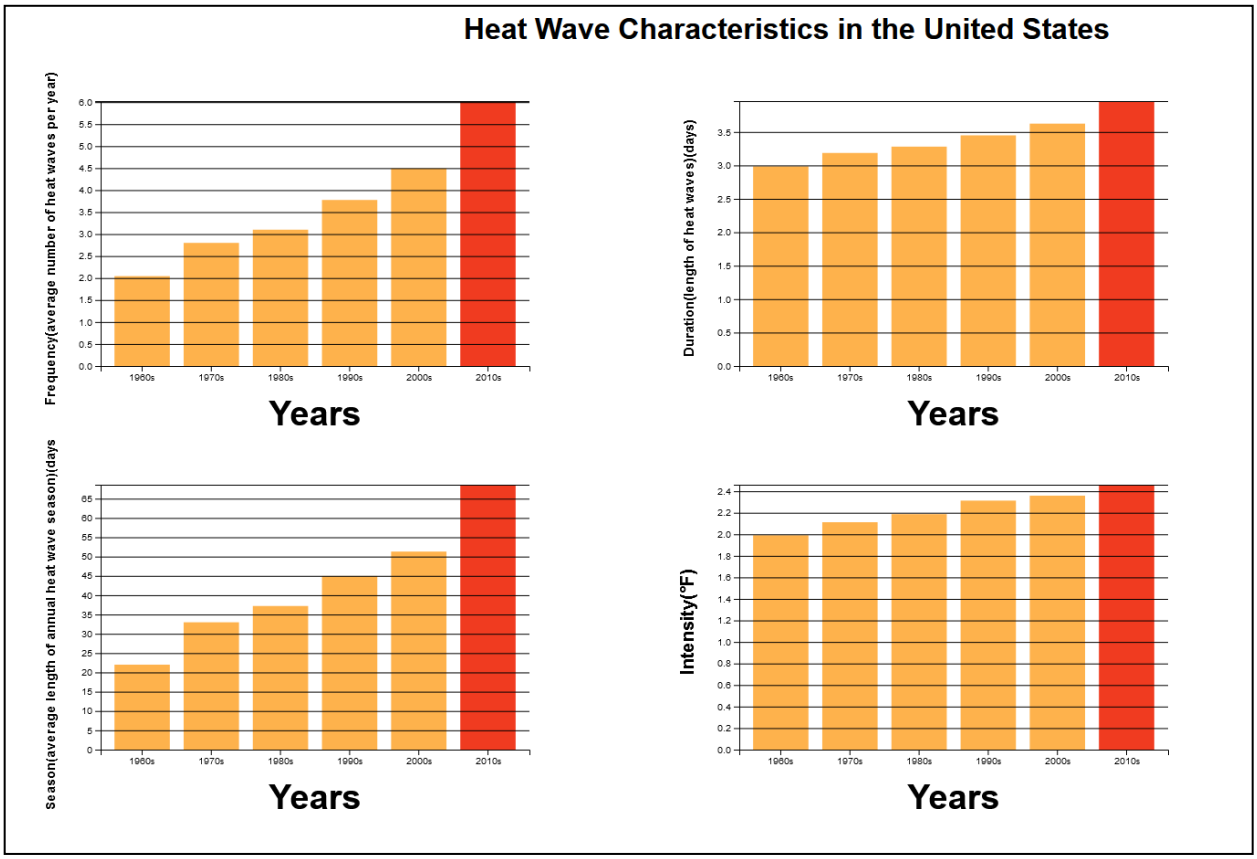
So, what is the reason that led to this situation? The answer is because of the economic development, people must pollute to product goods, electricity, and so on. Many people are of the opinion that if we want to be rich, we need to pollute. Hence, they just not care about the climate, and continue to make money despite polluting the environment.



Project of decrease global warming by 2100

The figure above shows that if people start to take actions about global warming, we will have changes to slow down the process of growing the Earth's temperature. The main target is that, in 2100, the Earth's temperature is growing at much 3 Celsius. Following this target, people will have change to fix and save the climate.

In some developed countries such as USA, the heat waves also have a trend to be increased. Take the graphs below as an example:

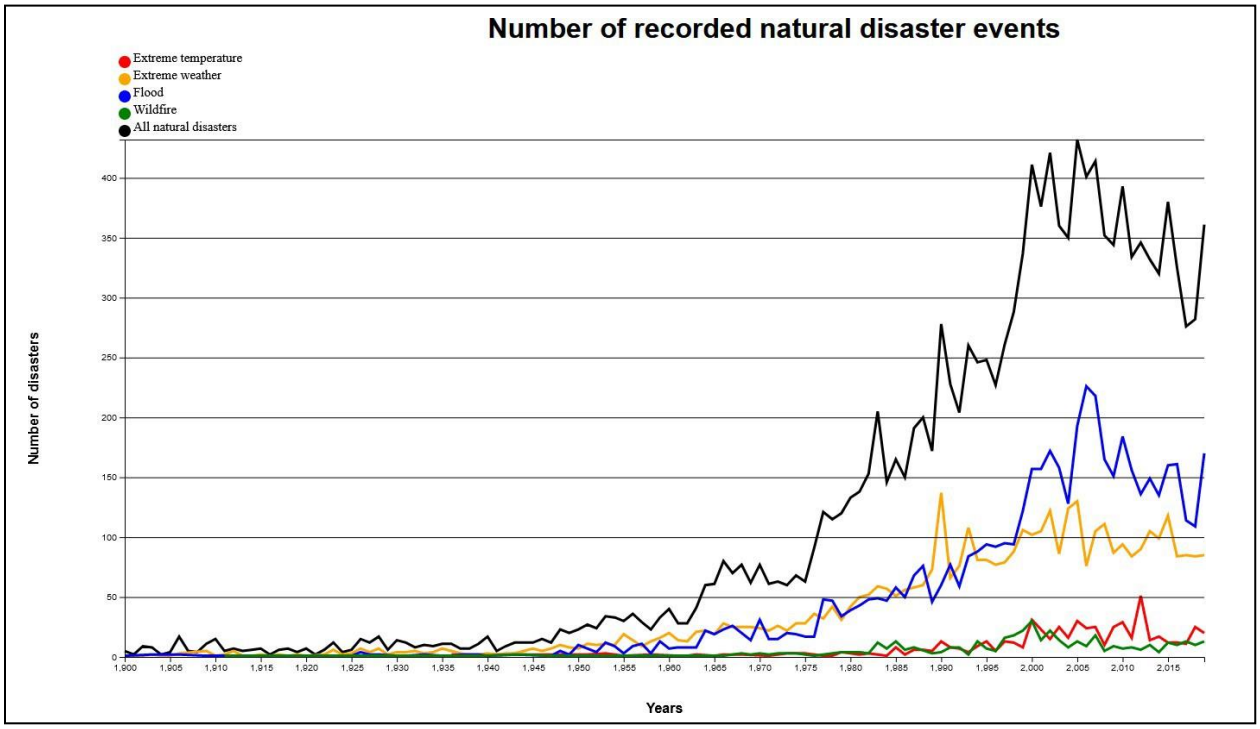


Heat Wave in the United States

Heat wave has a very negative effects toward the environment. This can lead to watershortages and effect the economic. In the following part we will analyze more aboutthe negative effect of global warming.

2. <u>Disasters on modern world:</u>

Many people believe that there is nothing change much when the earth temperature increase, but this is a totally wrong opinion. When the global temperature increased, the disasters occur more frequently. The figure below illustrates the number of natural disasters happen every year on the world:

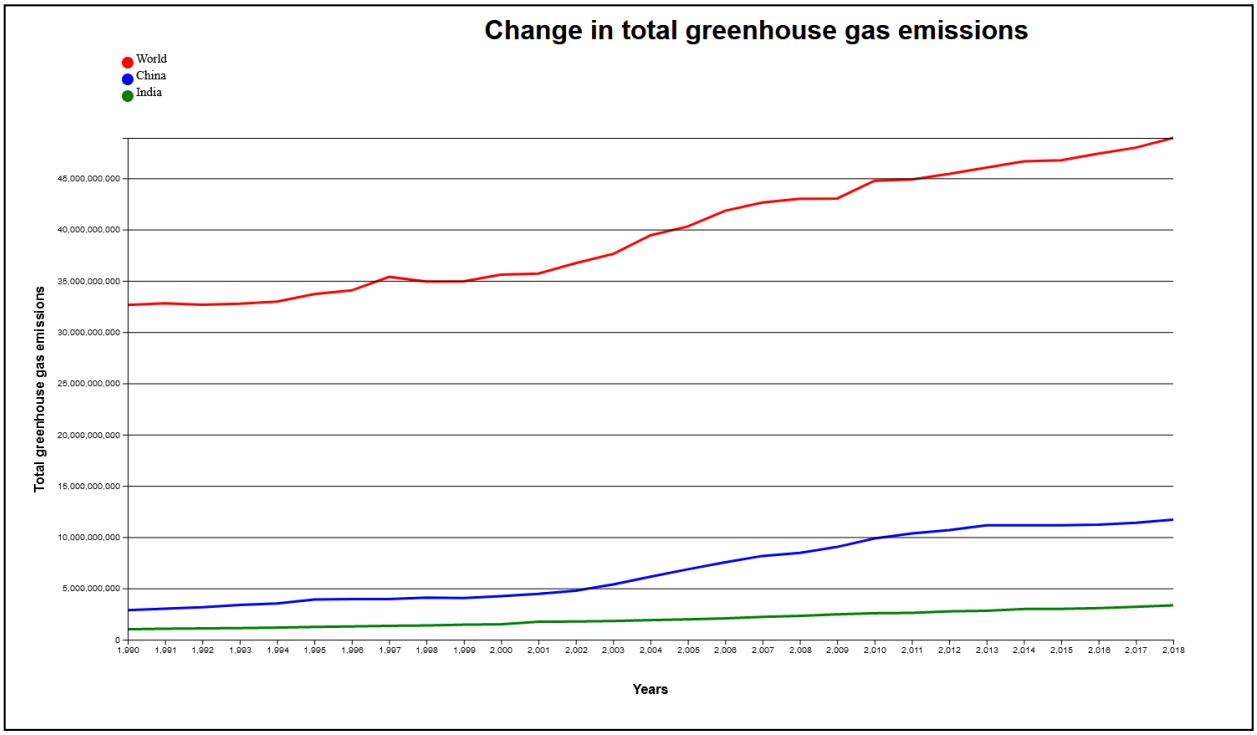


The number of recorded natural disaster events from 1900 to 2015

The chart reveals that since the temperature increase, the number of natural disasters has increased in recent years. Flood and Extreme Weather are two most frequent disasters, while Extreme Temperature and Wildfire occur less frequent.

IV. How have we changed to save the climate?

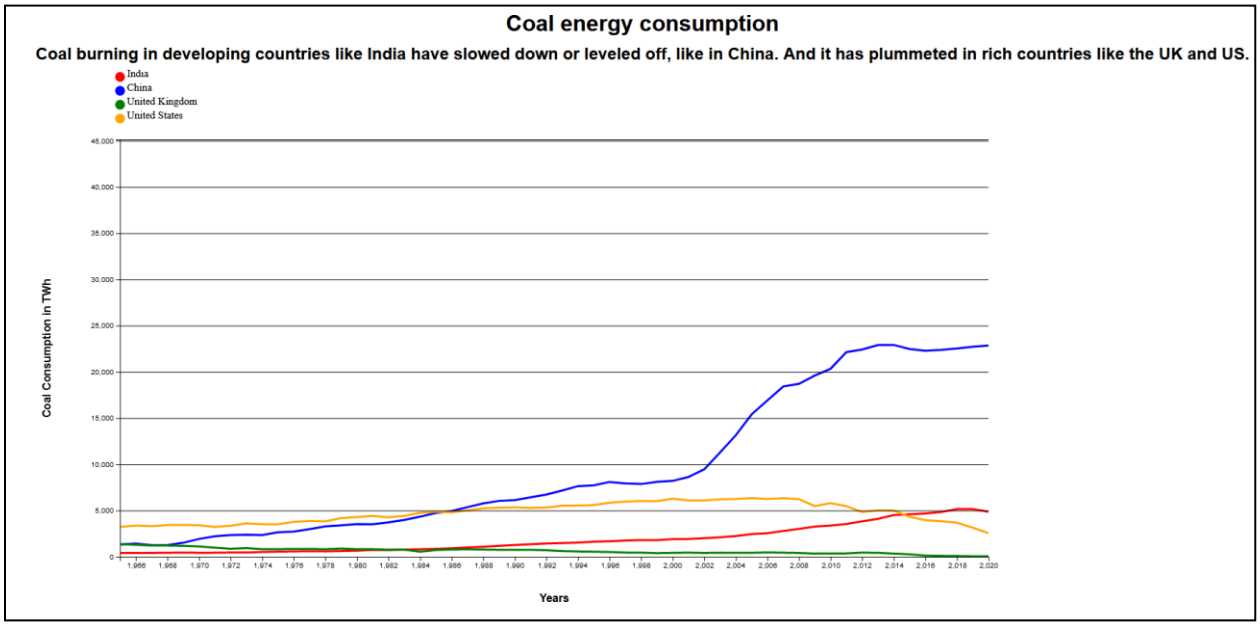
1. CO2 emission and the energy cost:



Change in total greenhouse gas emissions

So, what we have done so far to fix the climate? Between 2000 and 2010, greenhouse gas had grown by 24%, almost three times compared to the last decade. Some reason below this trend is, take China and India as example, coal was the cheapest fuel to be used to product energy and grow up their countries. On the other hand, rich countries also show just a little interest in changing the ways of making money. Fossil fuels will cause the increase of greenhouse gas and CO2 emissions, but it will allow the countries using them to grow the economic faster.

For emerging countries like China and India coal was the cheapest fuel to fire up their growth while rich countries showed little interest in changing their ways.

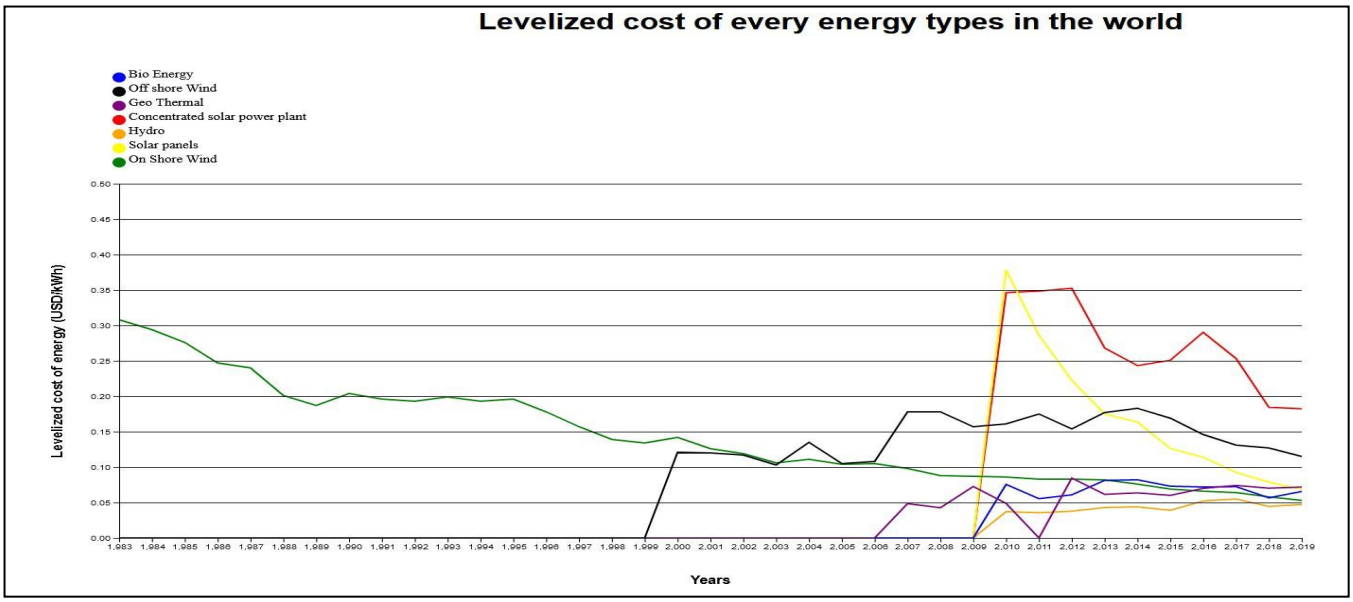


Coal energy consumption in India, China, United Kingdom, United States

Coal burning in developing countries like India have slowed down or leveledoff, like in China. And it has plummeted in rich countries like the UK and US.

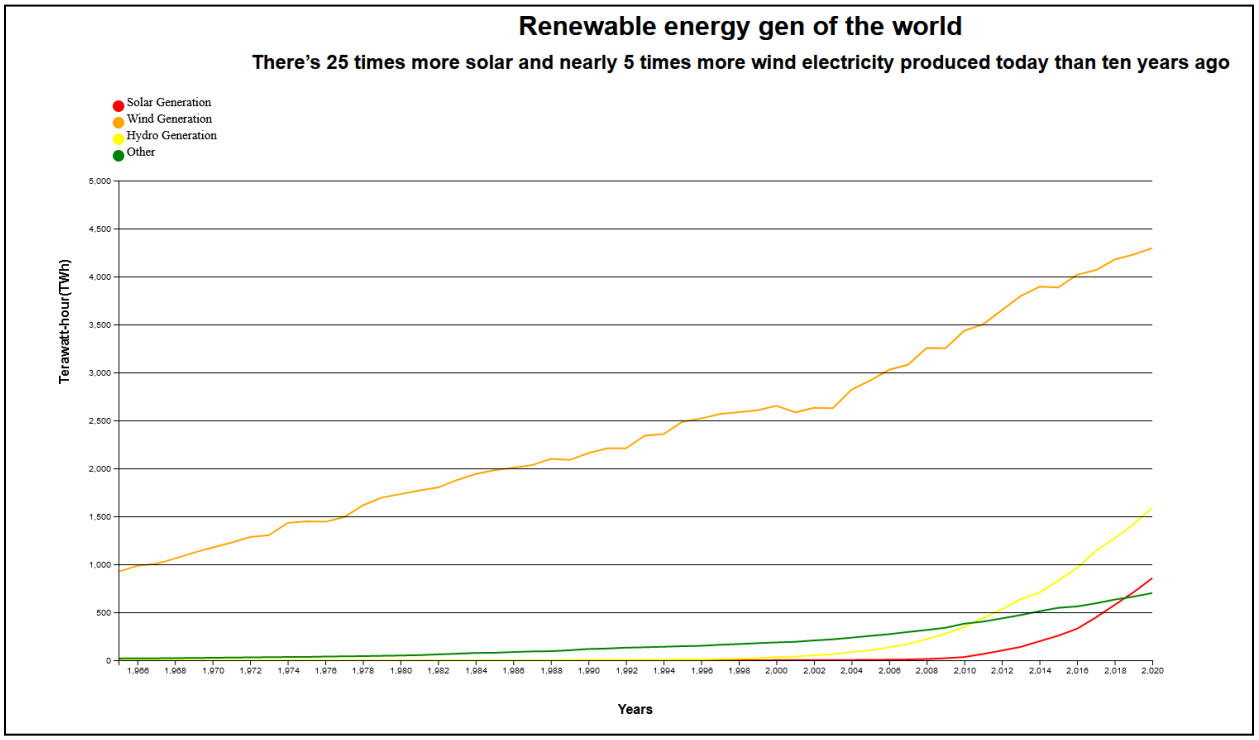
Three-quarters of planned coal plants have been cancelled since 2015, and 44 countries have committed not to build any more. It would have seemed wishful thinking ten years ago, but we can finally claim with confidence: coal is dying.

Levelized cost of energy types in the world



As we can see from the chart, new energy always cost more money to provide than the traditional types at the beginning, but in the future, the cost of this will be decreased every year.

It is simply no longer competitive. Because technologies that were expected to be pricey matured quickly instead. Renewable energy has made rapid progress. Wind energy has become three times cheaper in a decade. Solar energy is now ten times less expensive! Even with large subsidies and worldwide infrastructure, they are cheaper than coal or any other fossil-fuel burning power plant.

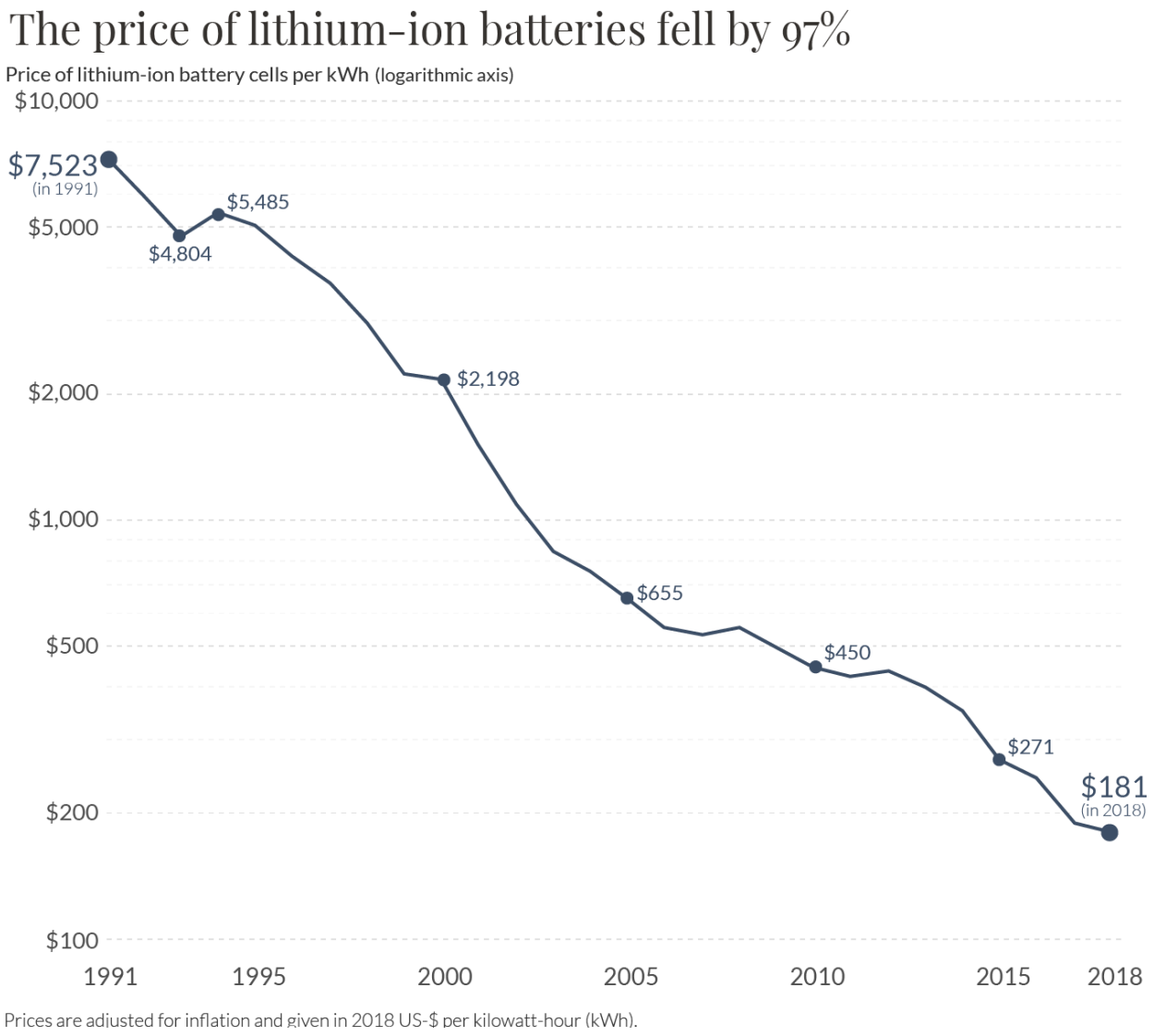


Renewable energy gen of the world

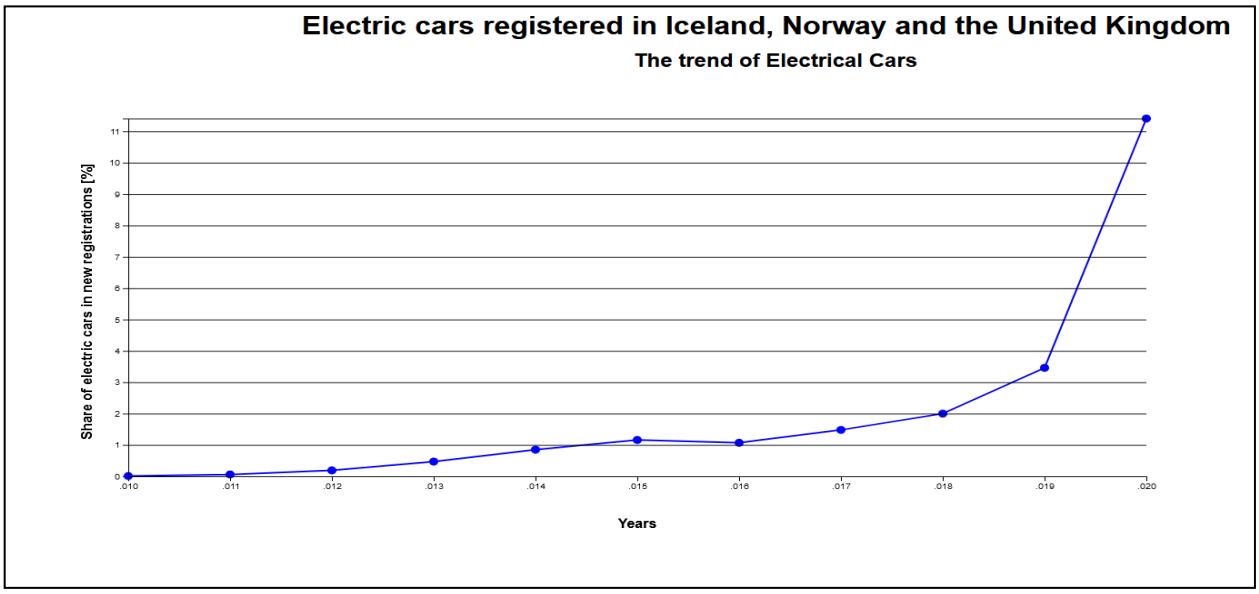
Many countries tend to product more renewable energy in the following year, and it is predicted that more and more country will use these types of energy in the future.

Today, nearly 25 times more solar and roughly 5 times more wind electricity is produced than ten years ago, which is obviously insufficient.

One of the most significant challenges is the inconsistency of their power supply. Renewables require a lot of energy storage, such as pricey batteries, to be a reliable power supply. Battery prices have dropped by 97 percent in the last 30 years, and by 60 percent in the last decade alone, which will benefit all types of green technologies such as electric cars.



2. New trend of electrical cars in developed country:

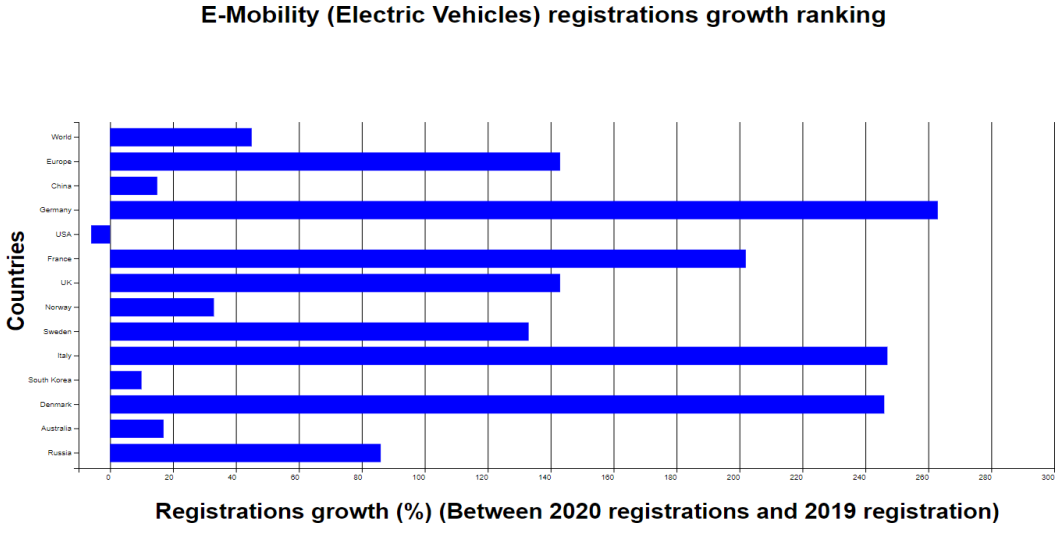


The proportion of electric cars registered in developed countries

In 2020, there is a massive increase in the proportion of electric cars registered by people in the following countries. By continue this trend, people may be solving the proportion of the climate problems

In 2020, around 7 out of 10 new automobiles in Norway were electric or hybrid, by2021, this number had grown to 8 out of 10.

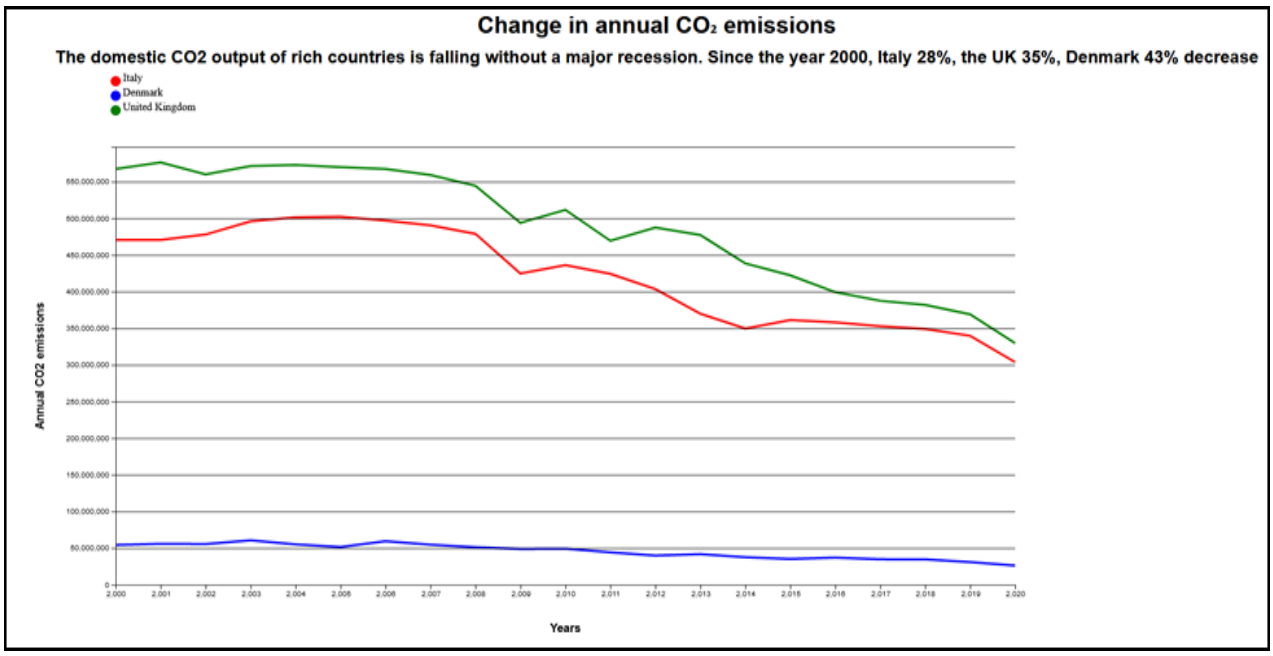
On a global scale, there was a 45 percent increase in 2020 compared to 2019, with some exceptional instances being Germany (+263%), Italy (+247%), and Denmark (+246%).

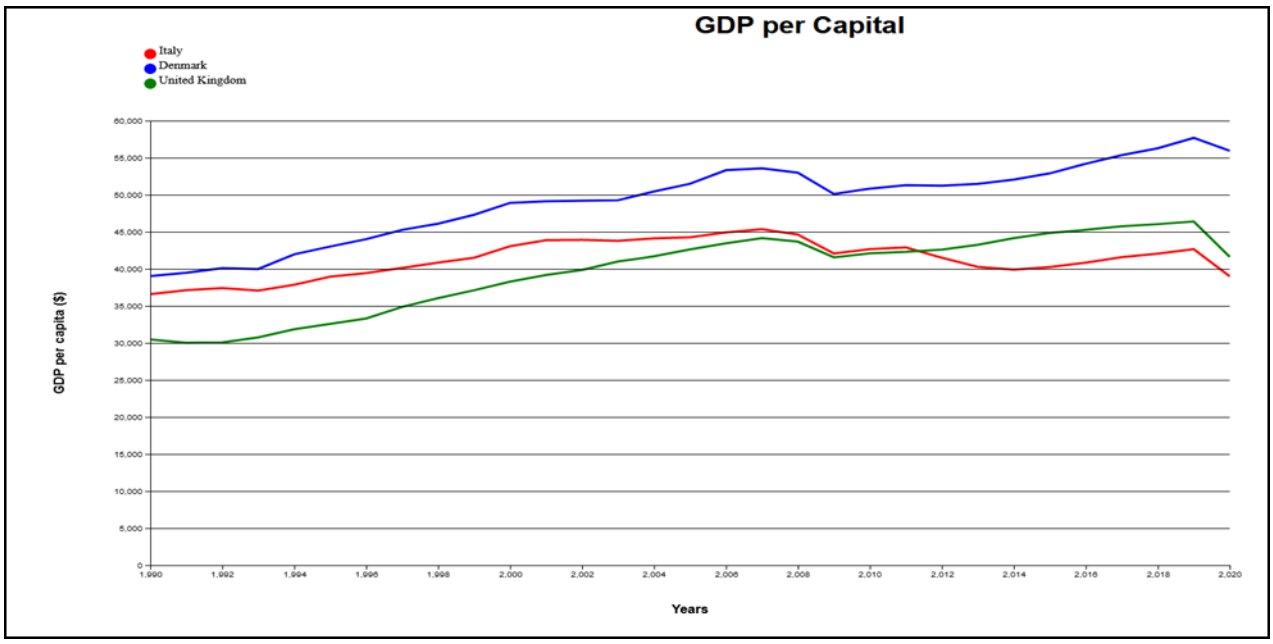


3. Save the environment vs economic growth

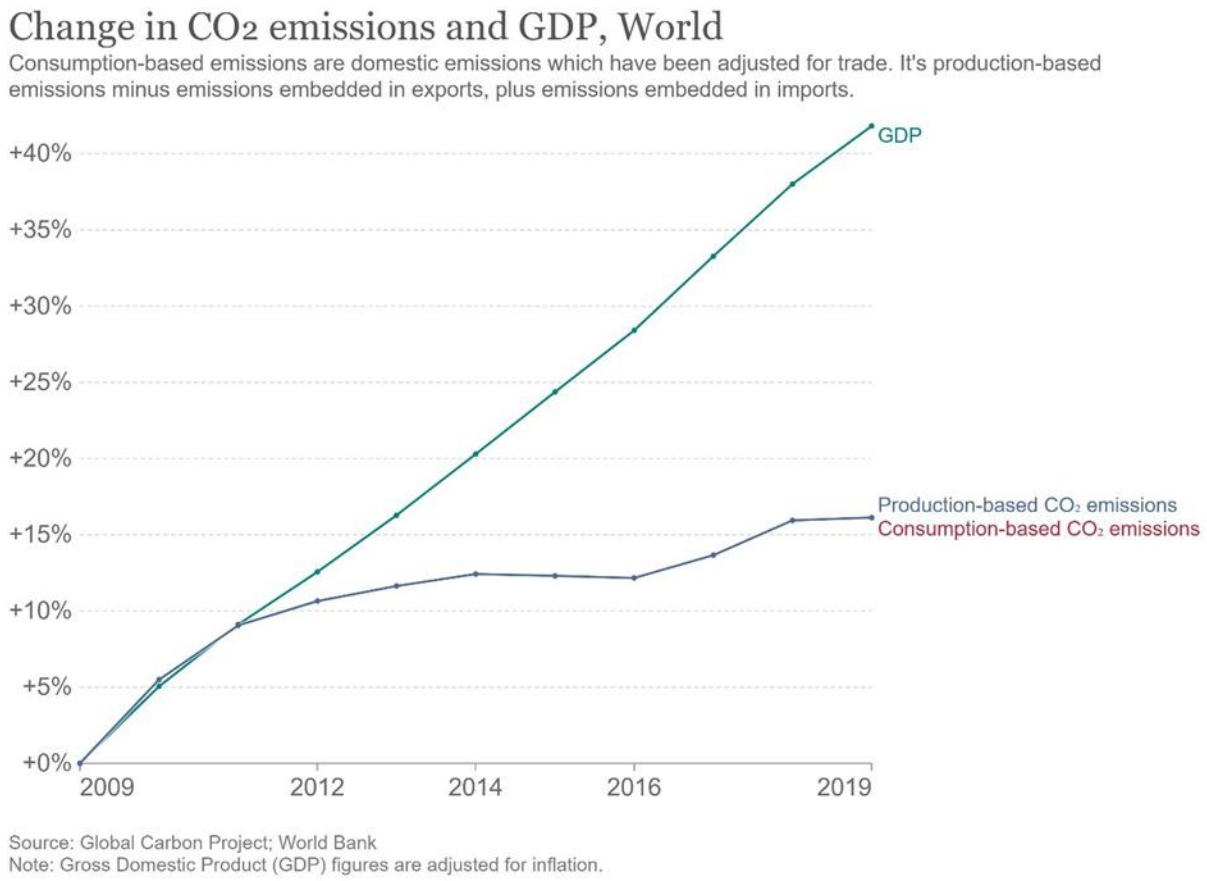
In the past, people think pollute is the only way to become rich. When they are rich, they can use the money to save the climate later. But in society today, the real data has proven that we do not need to pollute for becoming rich and making more money.

Without a significant recession, wealthy countries' domestic, CO2 output is decreasing. Since the year 2000, Italy has decreased by 28%, the UK by 35%, and Denmark by 43%.





The best news, though, is that emissions are no longer tightly linked to economic growth. This was an inconvenient truth in the past: to get richer, you had to emit more. As a result, developing and developed countries battled over whether it was fair to reduce emissions while their populations were still poor. However, we have shown in the last decade that it is possible to increase wealth without increasing emission.



Some of you may refer to this as a numbers trick. That affluent countries are just exporting emissions to poorer countries by shifting filthy aspects of their economies, such as manufacturing. Even when we account for all our imported items, this remains true! It is no longer necessary to choose between prosperity and the environment. as it appeared a decade ago.

V. Data and Coding:

In this project, our group has collected and use some data from the internet and use D3, HTML, JS, CSS to create and display the chart based on the data. We spend most time not just to analyzed and draw a suitable visualization for each dataset, but we must clean, modify the dataset to the visualization can work correctly. The code together with the dataset will be given in GitHub in thefollowing link:

https://github.com/GordonHuy/Data_Visualization_Project

VI. Message and Conclusion:

As we have said before, the message that we want to bring to people from this visualization project is that 'Can WE Fix the Climate?'. We can fix this by using the new type of environmentally friendly products and new types of energy. We do not have to pollute the environment to develop. Using the real data prove that, in the future, we may save the climate and protect the new generations. In the project, we might borrow some specific visualization since the lack of information and data, but our team are trying best to provide as much visualization as possible. We hope that by reading and reviewing our project, people will know more about the current situation of the climate and begin to fix the problem. Saving the climate is saving our future.

VII. Sources

- **https://sites.google.com/view/sources-can-we-fix-climate/**
- **https://youtu.be/LxgMdjyw8uw**