The headline of this book is really poignant**.  51 billion to zero.** The first number is the number of how many tons of greenhouse gases world adds to atmosphere every year. The second one is what we aim to produce. In order to make it happen everyone has to get involved.

Gates Foundation is focusing on global health, development and U.S. education. Foundation also helps with energy poverty. This is really a big issue in sub-Saharan Africa and Asia. By solving this problem, living conditions will go up rapidly.

There were many eye-opening ideas about the current situation of climate change. The text consisted of the authors idea or distributing accessible and reliable energy for the poor and helpful information about emissions.

It was written that **the climate change is like “a bathtub slowly filling up with water” it means that if we can’t avoid a climate disaster until our emissions are equal to zero.** He mentioned things that was convinced of over the years or study and research. One of them was to deploy the tools we already have like solar and wind power. He said that he will keep on educating himself about the topic and will probably try to find a reasonable solution.

In a way, **there is a close relation between Covid-19 and climate change.** Both of them are issues that affected the whole society tremendously. However, the difference between these two is that even though Covid-19 is “relatively new” compared to the global warming problem, we have been able to come up with a solution very quickly. And what we need to do at this point, is to try to do the same with climate change. No one is saying that it will be easy, but we do have the technology which they didn’t have in the past, and we also have many successful scientists who can help us to make this dream of ours, of a normal and healthy climate, come true.

Reducing to zero is the only way to stop this, yet it is not really possible àbut the bigger the change, the bigger the benefit. The only way to make a change is not only reduce the number of emissions, but also remove some of them from the atmosphere = net-negative emissions

Even a change in 1-2˚C is a lot and that – 4 difference in the past meant that crocodiles were able to live in the Arctic circle.

**Why zero?** ‌

greenhouse gases (produced by fossil fuels, making cement, using fertilizer, methane leaks...) stay in the atmosphere for a very long time (10 000years) --> if we keep adding them, the planet will get hotter, therefore it will be harder for us to survive ‌greenhouse gases will stay in the atmosphere even after we reach zero

before the mid-18th century, the earth's carbon cycle was in balance = plants absorbed as much carbon dioxide as was emitted

fossil fuels - made of carbon that's stored underground from animals, plants etc. that died million years ago and when we burn them, we emit extra carbon dioxide into the atmosphere ‌

there are no realistic paths to zero that involve abandoning the fields completely --> instead - we remove the carbon we produce from the atmosphere ‌therefore getting to "zero" isn't actually zero --> it means near zero ‌the bigger the reduction, the bigger the benefit (even though 50% drop in emissions would NOT stop the climate change - it would only slow it down)

if we reach 99% reduction - who is there to decide which countries/sectors of economy are to stay? ‌

reducing the number of emissions + removing them = net-negative emissions (we will need to remove more greenhouse gases from the atmosphere than we currently let out into it) ‌the only way to avoid disasters is to get to zero

Why are some places heating up more than others?

In the interior of some continents, the soil is drier – the land can’t cool off

Warming planet – **greenhouse gas emissions**

* Carbon dioxide – the most common greenhouse gas
* Nitrous oxide – laughing gas
* Methane – main ingredient in the natural gas
* ***Carbon dioxide equivalents***
* Have increased dramatically since the 1850s due to human activity – burning fossil fuels

**How do greenhouse gases cause warming?**

* Greenhouse gases absorb heat and trap it in the atmosphere because carbon dioxide works like some giant one-way mirror

**Explanations from physics and chemistry**

* All molecules vibrate – the faster they vibrate, the hotter they are
* When certain types of molecules are hit with radiation, soak up its energy and vibrate faster

**Why not all gases act this way?**

* Molecules with 2 copies of the same atom (nitrogen, oxygen molecules) let radiation pass straight through them
* Only molecules made up of different atoms have the structure to absorb radiation and start heating up

Scientists still have a lot to learn about weather. Even though our computers are on high level, they are far from perfect. Weather has a lot of variables which are constantly changing and there is a lot that we do not know about these variables. What we do know is that we are negatively contributing to weather changes. So far, we raised the temperature by approximately 1°C. Maybe it does not sound much but all this extra heat will cause enormous changes in the climate. Although we can not blame climate changes for everything, for example heatwaves because we do not know if these heatwaves were caused by climate change or not, we can say how much the climate change increased the odds of this to happen. Impacts of climate change made storms wetter and more intense. Bill is talking about Albuquerque in New Mexico-place where he and Paul Allen founded in 1975.The temperature went to 90 degrees Fahrenheit (32 degrees Celsius) averagely 36 times in a year. By the end of the century this number changed to 114 times in a year. Not everyone will suffer equally from hotter and more humid days.

For example there might be less death caused by hypothermia in cold regions.On the other hand this would mean that storms would get stronger.When the average temperature rises ,more water evaporates into the air.The water vapor is a green house.But unlike methane or carbon dioxide,it does not stay long in the air because it falls down as a rain or snow.The more water is in the air,the stronger the storm is. There is a loss of lives,structural damage etc.Hurricanes and floods also destroy lives,power lines and creations that took years to build.Except for lives,everything can be repaired.But it would take a lot of money and time

This part was mostly focused on heatstrokes and how they affect on us. They threaten our health condition, our work and overall our life. If the air is really saturated with water vapor it means that the air cannot absorb our sweat or just cool us off . Therefore, our body temperature is still high and we can die of heatstrokes within hours. Heatstrokes make life difficult also for farmers. Because after those hot days always comes big storm and damages all their crops which they planted. If it continues like this , farmers will have nothing from their own fields in the future. But in the worst conditions is India, where their temperature can hit almost 50 celsius so sometimes is impossible to keep all crops alive because of extreme heat waves.

Problems caused by climate change will have impact on our everyday lives in the close future (expected in 2030). These problems are pretty similar to the pandemic situation that is nowadays (loss of life, economy misery). The poorest people (farmers) have already difficult situation in taking care of their crops (heat waves, pests invading fields, less water, extreme droughts = lower crops yields), also because of the high temperature the permafrosts are melting and that releases the huge amount of greenhouse gasses that are trapped there. To fix this, we need to get every country to net-zero emissions by 2050. We can do also adaptation (minimalize the impact of the changes that are already here and we know are coming) and mitigation (stop adding greenhouse gasses to the atmosphere).

**This will be hard**

       The second chapter of this book starts with those words. Do not let it fool you,we cannot be negative about this, we need to be optimistic.

   Although there are many obstacles, difficulties and we realise that this journey will be hard,but there is still chance.We need to talk about solutions.In this few pages we are going to read about fossil fuels.

       Firstly, the author gave us some examples from one book. It was about 2 young fish, swimming through water. Suddenly, they met some older fish, that asked them "How's the water?" The point of this story was that they looked at each other and asked "What is water?".

   We often do not talk about the most obvious problems. We act like we do not see them.And one of this problems are fossil fuels.We can see many breathtaking and shocking examples where we can meet with fossil fuels.

  It started with our tooth brushes-they are plastic, made of petroleum=fossil fuel. Breakfast-meat-cows-they produce methane.Our houses are made of cement,our clothes contain cotton.All this material is harvested/made and have to be transported to its destination and there are used more and more fossil fuels.

   This is why the autor says **"Fossil fuels are like water."** We can see that they are really everywhere. And, **why is that? They are inexpensive**.

* Cheap price of fossil fuels
* Abundant and easy to move
* Don’t reflect the damage they cause (climate change, pollution and environmental degradation)
* Not only rich parts and people of the world
* Longer and healthier lives
* Standards of living are going up – need of more cars, roads, buildings, computers
* The amount of energy used per person will go up – the amount of greenhouse gases emitted per person
* Sources of energy – wind turbines, solar panels,… - releasing more greenhouse gases
* More people – more used energy
* Growth in developing countries (China, India, Nigeria)
* Nearly 40% of the world’s emissions produced by the richest 16% of the population

***What will happen as more people live like the richest 16%?***

* Global energy demand will go up 50% by 2050 – carbon emissions will go up nearly as much
* Even if the rich world could get to zero today – the rest of the world would still be emitting more and more
* ***We need to get to zero – producing even more energy than we do today, but without adding any carbon to the atmosphere – as soon as possible!***