

## 1. Introduction

Hello. My name is Ian Sutton — a warm welcome to you. This video is the third in a series to do with the realities and practicalities of meeting ‘Net Zero by 2050’ targets. In these videos we discuss what the phrase ‘Net Zero by 2050’ means, why it is important, why so many companies have committed to it, and — above all — whether it can be achieved given engineering, project management and financial realities.

In this particular video we take a look at what is meant by the word *NET* in the phrase ‘Net Zero by 2050’. Specifically, we look at how much reliance we are placing on technologies for removing carbon dioxide from the air around us. We will see that, although the use of such technology will be important, the speed at which it would need to be scaled up probably means that it will not achieve the benefits promised. That is, unless industry and governments around the world commit to a massive project to implement this technology on a massive and urgent scale. To date, there are no signs that such a commitment is in the offing.

Once more, welcome.

## 2. Additional Information

To learn more about Net Zero — what it is, and how it works — please check in at our web page, or join the discussion at our LinkedIn group. The links to these sites are provided in the description that goes with this video.

<https://www.technology-climate-change.com/>

<https://www.linkedin.com/groups/8989467/>

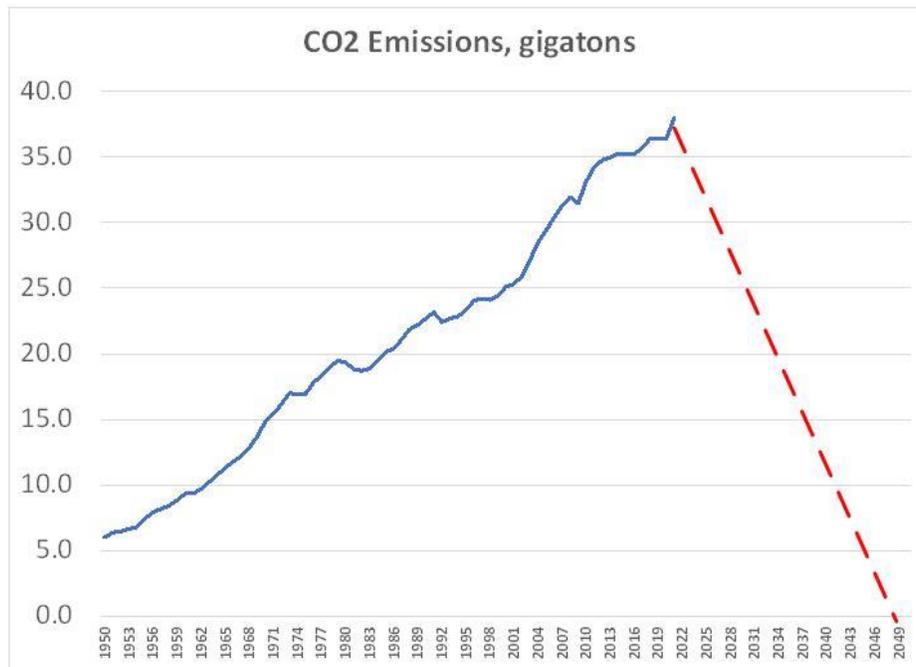
<https://iansutton.com/videos>

## 3. The Red-Face Test

Throughout these videos we will be looking at the realities of implementing good ideas at the required scale and in a short period of time. In many cases the cost is too high, sufficient resources are not available, and there is insufficient time. Moreover, the manufacturing and construction activity involved in introducing new technology at scale will require a large use of energy and fossil fuels, thus leading to yet more greenhouse gas emissions.

In other words, any proposed good idea has to pass the red-face test.

#### 4. The GHG Emissions Curve



We saw this chart in the first video in this series. It shows that in the year 1950 total emissions of CO<sub>2</sub> (all nations) were about 5 gigatons (that's 5 billion metric tons) annually. Since then the rate has climbed quickly and inexorably. It turns out that even the pandemic of the year 2020 did little to change the trajectory. We are now close to 40 gigatons per annum.

The chart also shows that we need to be at net zero emissions by the year 2050. In other words, in order to achieve the Net Zero goal, there must be no net addition of CO<sub>2</sub> and other greenhouse gases just 28 years from now. To do this we have to suddenly and drastically change the direction of this curve and cut back emissions at a rate that is about two times faster than we have been adding them. To describe this challenge as formidable is a gross under-statement.

#### 5. No Reduction

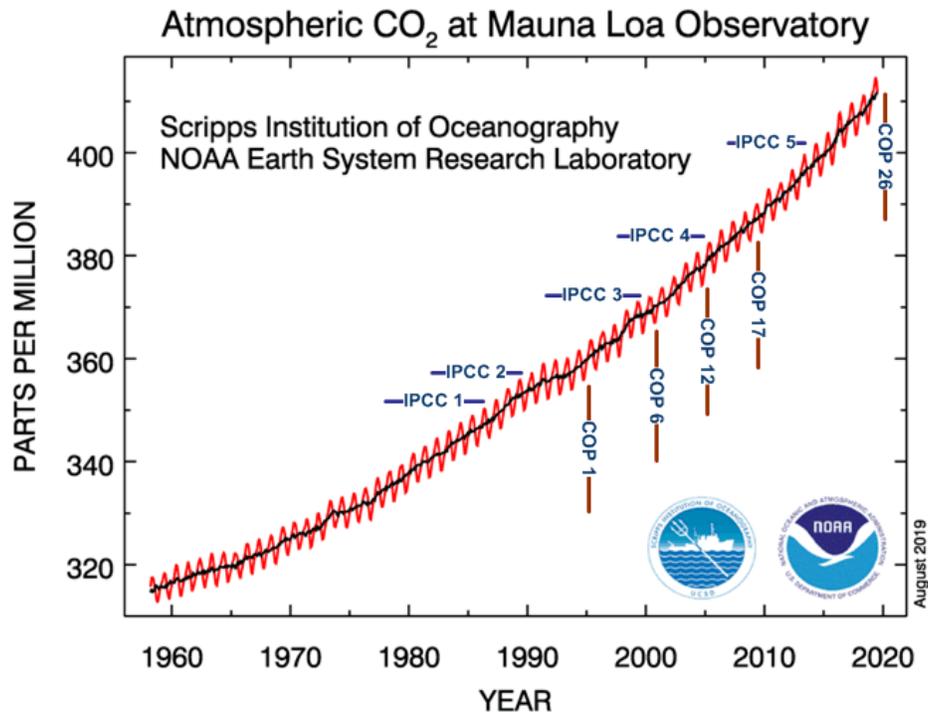
In the last few years many leaders in government and business have expressed their intent to significantly cut back emissions. Unfortunately, in most cases their actions do not align with their words.

In September 2021 a BBC report stated,

*Scientists have said that the planet needs to slash 45% of its emissions by 2030 to reach carbon neutrality by mid-century. But under current emissions commitments from countries there will be a 16% **increase** in emissions in 2030 compared to 2010 levels.*

In other words, we may reduce the *rate* of increase, but it seems unlikely that we will actually stop the increase and turn it into a decline. We will not turn the corner, we will still increase emissions. We frequently hear the phrase “bending the curve”. In order to reach Net Zero we need to not only bend the curve, we need to change its trajectory from positive to negative. It appears unlikely that this will happen, at least during this decade.

## 6. Impact of Conferences and Reports



This chart shows makes two points. The first is that CO<sub>2</sub> concentrations have increased steadily during the last six decades. The increase matches the emission rate line well.

The second point is to do with the many conferences been held and the reports that have been issued over the same period of time. They seem to have had no impact at all.

## 7. Carbon Capture

So we have a situation where emissions continue to climb for the indefinite future, but there is also an urgent need to reduce the level of CO<sub>2</sub> in the atmosphere.

Over the last few years there has been a slowly gathering awareness that carbon capture techniques will have to be used. In other words, CO<sub>2</sub> will have to be captured at the point of release so that it never enters the atmosphere, or else the some of the CO<sub>2</sub> that is already in the atmosphere is removed. In later videos we will look at the various approaches to this problem — some are biological, others use chemical processing technology.

For this current discussion we will use Direct Carbon Capture to illustrate the challenge that carbon capture faces.

At the time of writing (September 2021) the largest unit actually in operation is the Orca plant in Iceland. (The facility is located there so that they can run the unit on geothermal energy.) Its current capacity is 4,000 tons per annum. It consists of four modular units of the type shown.

To remove just 10% of the 40 gigatons of annual emissions would require that four million of these Orca modules be built, or about 100,000 units annually. They would all have to be powered with renewable energy so that they are not defeating the purpose for which they were built. Therefore assuming that they are not near a geothermal source, solar panels and/or wind turbines would have to be installed, along with energy storage devices for when the sun is not shining nor the wind blowing.

Although many companies are investing in carbon capture technologies, and although we can be certain that capacity will increase substantially in the coming years, a project to build that many facilities in such a short period of time would require an international commitment on a phenomenal scale. There are no signs that industry or government is close to making that commitment. Not only will the cost be enormous, the technology does not create a revenue stream. The CO<sub>2</sub> is buried. There is no financial return on investment.

### **8. Reality (slide removed)**

The word ‘reality’ crops up a lot in this video series. Frequent use of the word reflects the fact that many of the proposed solutions and responses to climate change are unworkable.

We have just seen one example of reality — in spite of the promises made, and the statements of good intent, the reality is that it is unlikely that nations, the world over, will cut their emissions to anything like the needed extent.

A second example of reality is to do with the rapid and massive deployment of proposed solutions. They sound good in theory, but cannot be implemented given the short amount of time available to us. The rapid implementation of Carbon Capture technologies is likely to be an example of a good idea that deserves our support, but that is not likely to have the impact at scale that its supporters are hoping for in the time available.

### **9. The Real Challenge**

We have already run across two “realities”. The first is that the nations of the world are highly unlikely to cut their emissions by an amount anything close to what is needed. We

have also seen, using carbon capture as an example, that scale up of technologies to the degree required looks unrealistic.

But there is a third issue to do with reality that probably lies at the base of the first two, and that is to do with whether people even accept that there is a problem that needs to be addressed, particularly if drastic action is called for.

This chart is taken from a March 2021 report entitled 'Climate Change in the American Mind'. The chart shows that, in spite of all the learned reports that have been published and the expensive meetings that have taken place, the number of Americans who think that "global warming is happening" is around 70% — and that number has not changed for the last 12 years.

In other words, if we wish to "bend the CO<sub>2</sub> emissions curve" then the real challenge is not which technology we use, or how quickly we can install that technology. The real challenge is persuading people that change is needed, and that sacrifice may also be needed.

## **10. Conclusion**

Well, that brings us to the end of this brief video — we hope that you have found it useful and interesting. I hope that we have a better appreciation as to how challenging meeting the Net Zero goal is going to be, and the magnitude of effort that will be needed to implement carbon capture technology at sufficient scale.

The tone of this video has been deliberately somewhat downbeat — we need to face realities. But, once we have done so, it becomes possible to work on realistic responses to the dilemmas we face.

Don't forget, if you would like to see written material that goes with this presentation, including the text of this video, check out the links shown in the description section.

Once more, thank you for joining us.