

Original Paper

Approaches to Climate Change: Something Is Missing

Jan-Erik Lane^{1*}

¹ Professor Emeritus, University of Geneva, Geneva, Switzerland

* Jan-Erik Lane, University of Geneva, Geneva, Switzerland

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Abstract

The Paris agreement from 2015 is not what the masses had hoped for. The IPCC has made a great effort to gather information for global policy making, but the Anthropocene fear of global warming has not been appeased. Why is this? Climate change theory does not consider how states and their governments engage in strategic gaming.

Keywords

Paris agreement, public international law, realpolitik, moralism

1. Introduction

The COVID19 intermezzo was a short run shock that several states counteracted rapidly by forceful means. Now the infernal set of “tipping points” makes mankind fear climate change. These tipping points are in reality positive feedback loops reinforcing global warming—Hawking’s irreversibility. Why will not governments fulfill their Paris agreement obligations?

The interaction between humans and Nature is slowly changing. From mankind exploiting Nature for its own benefit, it now appears that Nature is posing lethal threats to humanity such as COVID-19 and global warming. The Corona virus threat acts on short term, while climate change is a long term challenge.

As nations start opening up their social systems, one may wonder what is next inside for Planet Earth after this terrible short term shock. The global warming threat is forever present, but the consequences may need long time periods to evolve. It is a matter of a slow moving disaster with potentially dismal ramifications for the global economy. Much depends on the strength and timeliness of positive feedbacks as well as the adaptability of mankind. The prediction of abrupt climate change as soon as 2030 or earlier is probably an exaggeration, so where do we stand today? Figure 1 illustrates the relative amounts of different greenhouse gases.

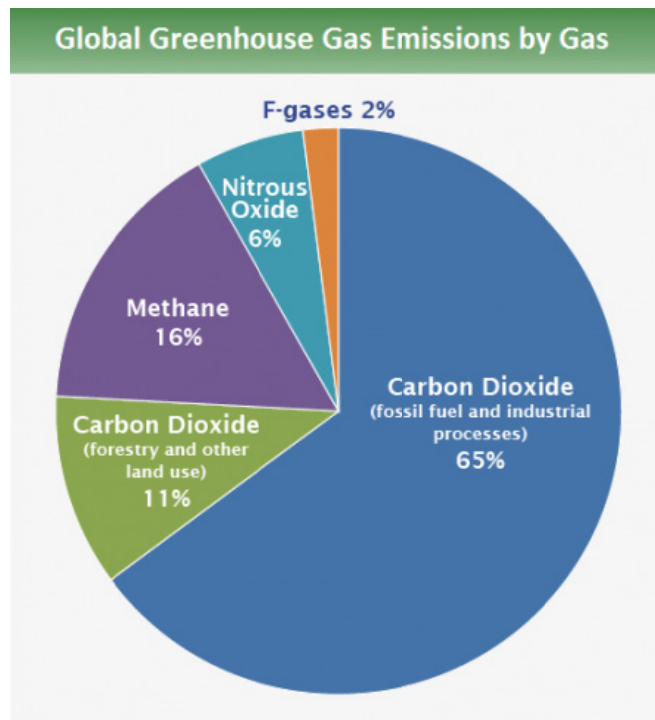


Figure 1. Worldwide Greenhouse Gases by Substance (EPA)

As CO₂(Carbon Dioxide) and CH₄ (Methane) constitute the bulk of worldwide GHG emissions, we will concentrate on finding models for their numbers. The omnipresence of CO₂ and CH₄. The baseline facts about carbon dioxide and methane can be stated in a simple chart, depicting developments after the Second World War.

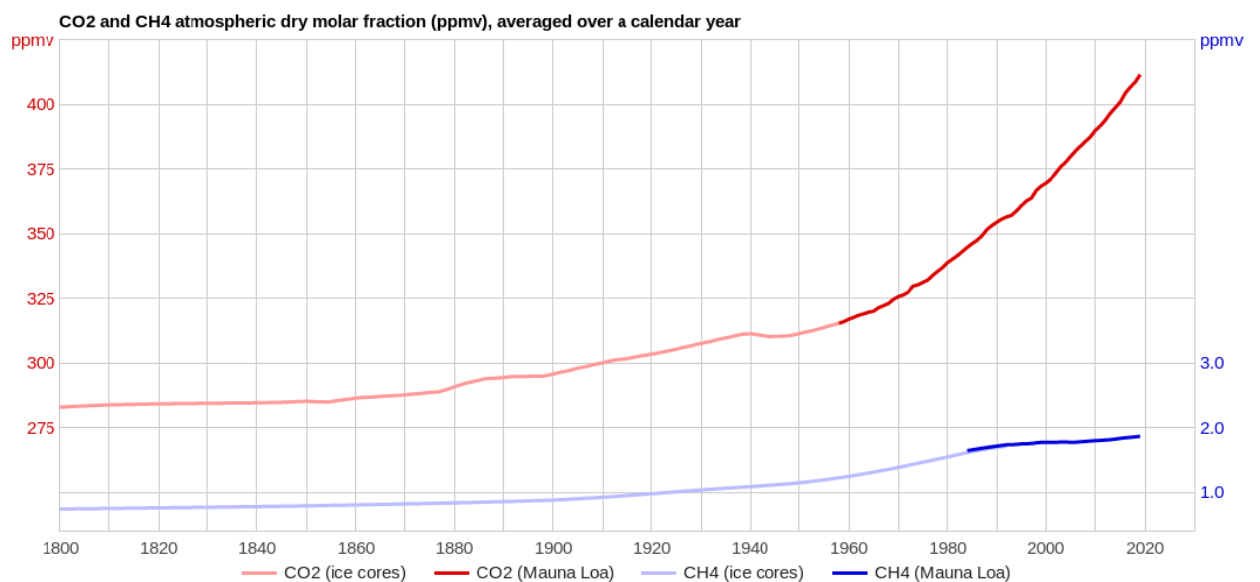


Figure 2. CO₂ and CH₄ Concentration (Sealevel)

Figure 2 displays these two threats to mankind: CO₂ concentration and CH₄ emissions.

2. CO₂ Concentration

It should be considered somewhat surprising that the Keeling curve has risen also during the COVID 19 pandemic, reaching a value of 418 ppm (). However, it should be remembered that greenhouse gases originate from various human activities and all of them have not been shut down. There is an ongoing revolution in transportation with the coming of EV (Electrical Vehicles), but the majority of the world's population can still not afford this expensive mode of transport. Moreover, housing, heating, electricity and agriculture continue, emitting CO₂. Figure 3 shows greenhouse gases divided by sector.

The impact of carbon dioxide is primarily an increase in temperature, indirectly causing a number of outcomes, and reinforcing global warming by means of positive feedback loops. Over time, the relationship between CO₂ concentration in the atmosphere and temperature increase can be modeled as a linear function as follows:

$$\text{Temperature Increase / degrees C} = -3.3 + 0.0103 * \text{CO}_2 / \text{ppm} \quad (1)$$

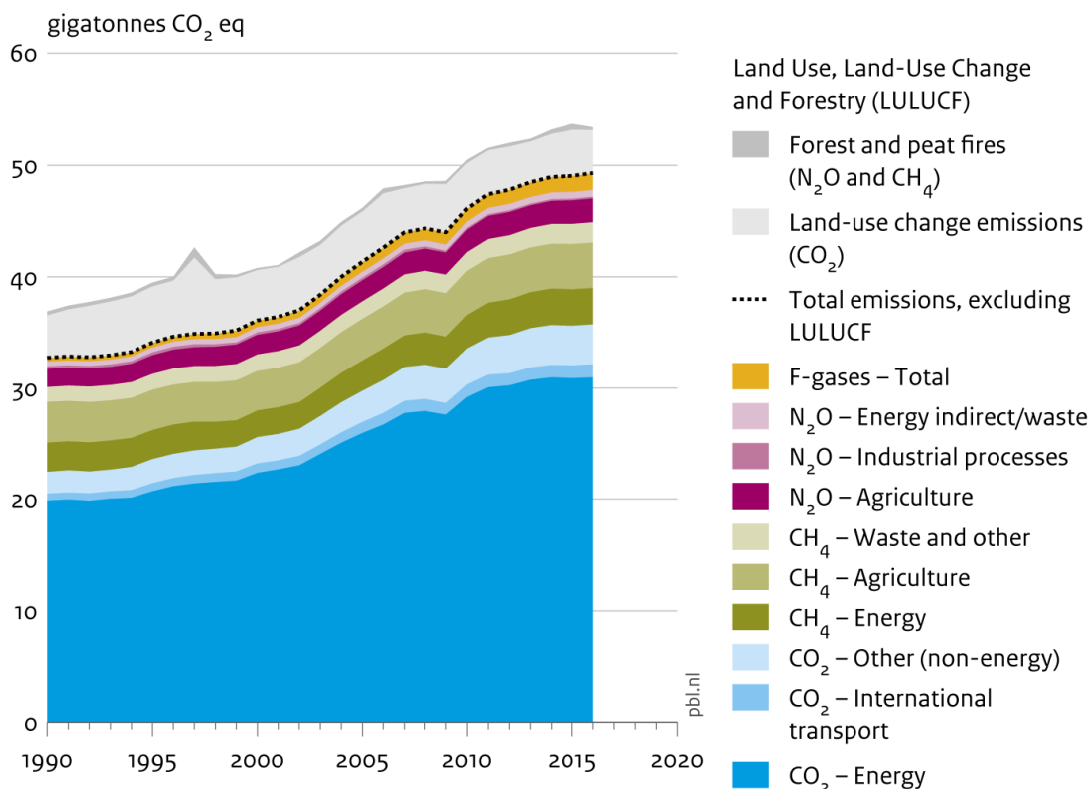
Given the current level of CO₂ of 418 ppm, global surface temperature has increased by 1 degree C. If and when we reach 500 ppm, the temperature rise would according to the model become higher than the 1.5 degree max target of the 2015 Paris agreement (1.8 degrees). The abrupt theory of climate change implies that we will reach 500 ppm as soon as within ten years. Yet, global warming is a slow process, albeit Hawking irreversible.

Besides CO₂ emissions, much more attention must be paid to the thawing permafrost in the Northern Hemisphere.

3. CH₄ Emissions

When emissions of CH₄ are added to the global warming picture, things become even worse. Methane emissions originate almost exclusively from agriculture and natural gas production.

Global greenhouse gas emissions, per type of gas and source, including LULUCF



Source: EDGAR v4.3.2 (EC-JRC/PBL 2017); Houghton and Nassikas (2017); GFED 4.1s (2017)

Figure 3. 2017 Worldwide Greenhouse Gas Emissions by Gas and Sector (PBL)

In the future, CH₄ may come from the tundra where the permafrost is now thawing. This trend is extremely dangerous and volatile, as the amount of carbon stored in the Northern Hemisphere underneath the permafrost is excessively huge. When we model the relationship between CH₄ and temperature increase, we get the following linear regression line:

$$\text{Temperature increase / degrees C} = -1.16 + 0.00094 * \text{CH}_4 \text{ concentration / ppb} \tag{2}$$

4. The Logic of State Action

The governments of the nations of the world have delayed action on climate change for more than 30 years. The next IPCC conference has now been postponed until late 2021. What interests do governments pursue in climate change policy making?

First, one needs to focus on which states are responsible for the most emissions. Table 1 and Table 2 presents the 10 biggest polluters of CO₂ and CH₄, respectively, the “Mega Polluters”.

Table 1. 10 World Leading Emitters of CO2

Country	Emissions / billion tonnes	Share / %
China	9.4	27.8
United States	5.2	15.2
India	2.5	7.3
Russia	1.5	4.6
Japan	1.1	3.4
Germany	0.7	2.1
South Korea	0.7	2.1
Iran	0.7	1.9
Saudi Arabia	0.6	1.7
Canada	0.6	1.6
	23	67.7

Table 2. 10 Leading Emitters of CH4

Country	Emissions / gt CO2 equivalent	Share / %
China	1.75	21.87
India	0.64	7.94
Russia	0.55	6.81
United States	0.50	6.24
Brazil	0.48	5.95
Indonesia	0.22	2.79
Pakistan	0.16	1.98
Australia	0.13	1.57
Iran	0.12	1.51
Mexico	0.12	1.46
	4.66	58.11

Given that only 10 countries produce more than half of the world's greenhouse gases, it is a remarkable fact that small countries aiming at zero emissions don't matter at all.

Furthermore, the basic interests of states have been theorized in two contrary approaches: on the one hand, *realpolitik* versus *moralism*. The first of these focuses on state power and its maximization in an environment of anarchy, while the second rejects state egoism, especially denouncing war, arguing that states are bound by basic model principles of humanity: *pacta sunt servanda*, speak the truth, never attack unless attacked, and pay compensation for damages.

The environmental movement would like to add *sustainability* to these basic norms. Recently, moralism has made advances in public international law, e.g., the International Court of Justice, but realpolitik remains dominant in international relations. Thus, governments can sign declarations for environmental policy purely for tactical reasons without ever implementing them. When looking at the lists of mega-polluters in the global climate change game with prisoners dilemma (PD) theory, one understands why climate policy making has failed. There is no organization or body with the authority to force China, India and the United States to leave the path of fossil fuels. The weakness of moralism in public international law is the lack of enforceability. The EU promising carbon neutrality by 2050 can not force Germany to stop its huge consumption of coal.

5. Conclusion

The fear of abrupt climate change is exaggerated, as global warming involves a low but steady temperature increase. It will hit mankind through multiple positive feedback loops, but they all require time before their impact reaches their maximum. So many of the human-experienced consequences of climate change, including possible changes through global ocean currents, the melting of the North Pole, Greenland and Antarctica, will be slow. On the other hand, nobody knows what temperature rises mankind can support. How soon global warming will be lethal for humans depends also on what responses Governments take in the form of reducing coal power in particular, subsidizing electrical vehicles, protecting all kinds of forests and setting up large carbon capture facilities.

Apparently, increases in temperature in the Anthropocenic period have reached a value of 1 degree Celsius, caused by emissions of both CO₂ and CH₄. Carbon dioxide seem to be more important than CH₄ as of now, but that may change in the coming decade. When global warming passes 2 degrees, a number of tipping points will be triggered. Nobody knows how large temperature increase mankind can support in different parts of the world. People will migrate.

When administrations really start to reduce their Mount Everest of carbon dioxide emissions, they have a long way to go before carbon neutrality or even carbon negativity can be accomplished, but what to do if methane emissions start increasing rapidly?

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