

THE BIG POLLUTERS**Jan-Erik Lane***

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During the tumultuous COVID-19 pandemic, one may wish to remind of the dangers of unstoppable global warming as well. Both these calamities threaten mankind, but they are in no way the same, one acting on short term and the other in the long run. As of today (April 7, 2020) the CO₂ concentration stands at its highest ever, more than 416

ppm (Earth) despite the closure of many factories and less traveling. The Paris Agreement from 2015 commits all participating governments (not including the United States) to stabilize and start decreasing CO₂ emissions. How?.

KEYWORDS: Carbon Neutrality, Carbon Capture, Major Polluters, Coal Power, Energy, Climate Change, UN IFCC.

INTRODUCTION

It has recently been suggested that the greenhouse gases (GHG) have increased so much that the world should consider carbon sequestration and/or capture. This technology is only known on a micro scale, and it is probably very expensive, but this has not stopped California from endorsing it in its plan for carbon neutrality by 2045. This paper will argue that carbon capture simply does not hold the solution to the global warming of rising CO₂ emissions. Consider Figure 1.

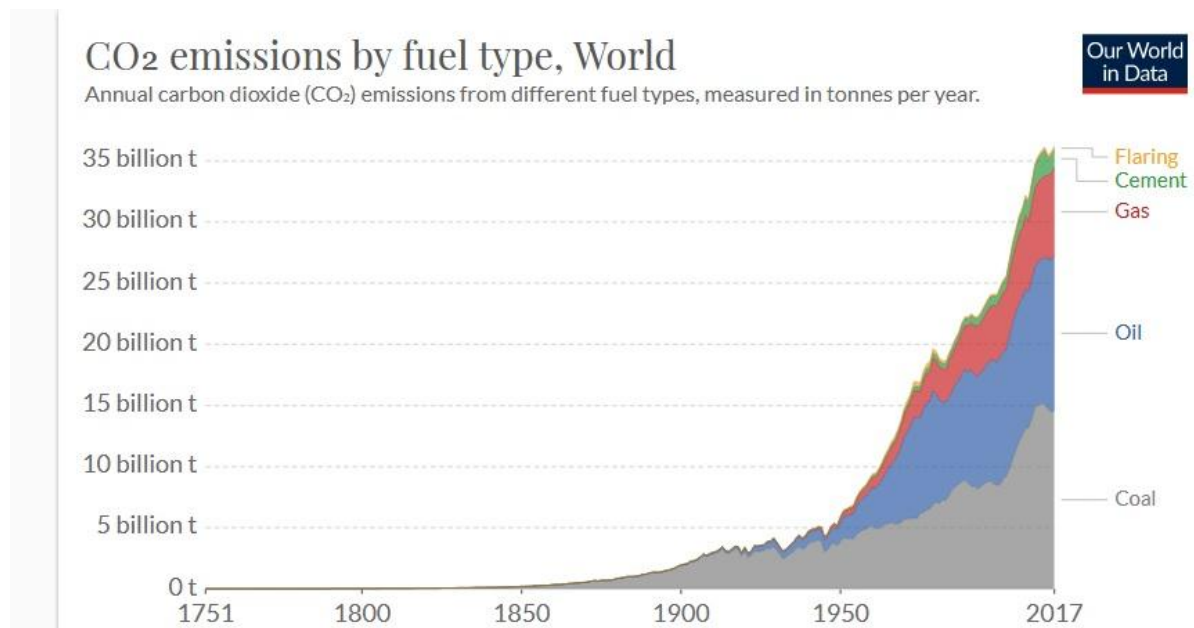


Figure 1: CO₂ Emissions by type (Our World in Data).

We should target coal-fired plants as well as the omni-present usage of charcoal in poor countries. The consumption of coal leads to the worst record of CO₂ emissions of all fossil fuels, and it can be replaced by other fossil sources or renewables together with nuclear power.

Energy and Emissions

The world economy and global warming has a strong relationship to energy. Energy is vital for large scale economic output and energy results in green house gases when fossil fuels are burnt. Thus, when energy supply must be transformed to renewables then what are the economic consequences. Or if the world does face Hawking irreversibility, can fossil fuel energy be cut back without economic recession?.

Energy is the capacity to do work, thus extremely valuable to human beings and societies. Its use is essential in economic affairs as well as in politics and military matters. Energy consumption has virtually exploded after WWII, but it has a drawback in the form of greenhouse gases. Planet Earth wants ever more energy, but it should fear climate change. This conflict will most likely run through this entire century, however it may be resolved.

Countries place great emphasis on secure access to affordable energy from internal or external sources. Table 1 shows that the biggest countries are also the biggest consumers of energy and coal power in particular.

Top 20 Energy Consuming Countries 2018	Top 20 CO ₂ Emitting Countries 2018	Top 20 Producers of Coal Energy 2019
China	China	China
United States	United States	United States
India	India	India
Russia	Russia	Russia
Japan	Japan	Japan
South Korea	Germany	Germany
Germany	Iran	South Africa
Canada	South Korea	South Korea
Brazil	Saudi Arabia	Indonesia
Iran	Canada	Poland
Indonesia	Indonesia	Australia
France	Brazil	Ukraine
Saudi Arabia	Mexico	Turkey
Mexico	South Africa	Vietnam
United Kingdom	Turkey	Taiwan
Nigeria	Australia	Malaysia
Italy	United Kingdom	Kazakhstan
Turkey	Italy	Spain
Thailand	Poland	United Kingdom
South Africa	France	Philippines
Share of World: 75.2 %	Share of World: 78.5 %	Share of World: 93,8 %

It is a characteristic of global coordination efforts by the United Nations is to create an ocean common pool regime. This has attracted the interest and support by mainly affluent small nations. The Big Polluters play the PD-game virtuously, leading to constant delays of the entire process since 1990 and the eventual abrupt defection from the largest economy in the world, the United States. Both China and India claim that they can't do without coal-fired plants, and poor people in Africa and Latin America cut down forests to sell cheap charcoal. So where are we today?.

The Damocles Sword

By 2030, the Earth will experience temperature increases between 1.5 and 2 degrees Celsius, somehow considered as magical breaking points by experts like Nordhaus and Stern, who argue that the cost of global warming will become too high when these limits are exceeded (Stern 2006; Nordhaus 2013). In reality, the social and economic effects of global warming would be very much exacerbated when the rise is greater than 2 degrees Celsius (Stern 2006). The global energy / environment problematic contains three factors:

1. Energy Consumption (unit: billion tonnes of oil equivalent)
2. CO₂ Atmospheric Concentration (unit: ppm)

3. Global Temperature Anomaly (unit: Degrees Centigrade)

At present, we stand at almost 16 billion tonnes of oil equivalent in annual world production, which has led to a near one degree rise in global temperatures. The future holds the scenarios presented in table 2.

Table 2: Regression estimates for temperature rise based on energy consumption.

Global Energy / btoe	CO2 concentration / PPM	Temperature rise / degrees C
16	430	1.1
18	450	1.3
20	470	1.5
22	490	1.7
24	510	2.0

In Table 2 the relationship between energy consumption and temperature rise is modelled. Energy consumption is near 16 billion with + 1 degree. Looking at stylised projections, we will move towards 24 billion with + 2 degrees. That would create lots of difficult problems for mankind.

It follows from Table 2 that if energy consumption keeps rising according to predictions, we will soon reach +2 degrees. Any further increase in energy consumption will release the Damocles sword of higher temperature rises. Can mankind survive +3 or +4 degrees?

Phasing Out Coal Power

Below we make an attempt to calculate how much solar energy would be required to replace coal power. As benchmark the Bhadla Solar Park in India is used, projected to deliver 2255 MW once construction is ready from December 2019. In all, 900 such plants would be necessary to completely eliminate all coal power generated in 2018. Table I illustrates how many solar plants of this size each of the ten biggest coal producing nations would need to install to replace their entire coal power production.

Table 1: Number of Bhadla Solar Park plants required to replace coal power by country (Global Energy Monitor).

Country	Number of plants
China	475
India	100
Japan	28
South Korea	18
Turkey	9
Americas	
United States	106
Colombia	1
Europe:	
Germany	32
Russia	30
Africa:	
South Africa	14

CONCLUSION

It is obvious that developing countries raise demands on developed countries to assist them with energy transformation. They have been pledged huge economic support in the Paris Agreement, and the industrialised world has shown in the fight against COVID-19 that they are capable of raising enormous amounts of money when needed to fight against internal costs caused by the spread of lethal viruses. The only way to combat the external costs of CO₂ emissions is to start NOW the phasing out of coal power, and not build new such plants. Surely, the rich countries can afford to help the developing world to move away from coal power. The major polluters have until now not lived up to their responsibility, as the UN IFCC process merely adds transaction costs. The big difference between COVID-19 and global warming is that governments behave opportunistically in relation to CO₂ emissions: myopia, delay, cheating, and climate denial. Such a strategy would be revealed as catastrophic in relationship to COVID-19, but concealed with regards to global warming because of the long time frame.

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