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Original Paper

GLOBAL WARMING AND ENERGY: Hawking's Inevitable Scenario

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Abstract

Global warming is the result of an enormous drive for energy during the last 150 years. And demand keeps going up making the COP goals unachievable. I will argue for this inevitability by means of both global and local evidence.

Keywords

Quest for energy, fossils dominance, CO2 total and per capita, Qatar

1. Introduction

Figure 1 shows the major kinds of energy today.

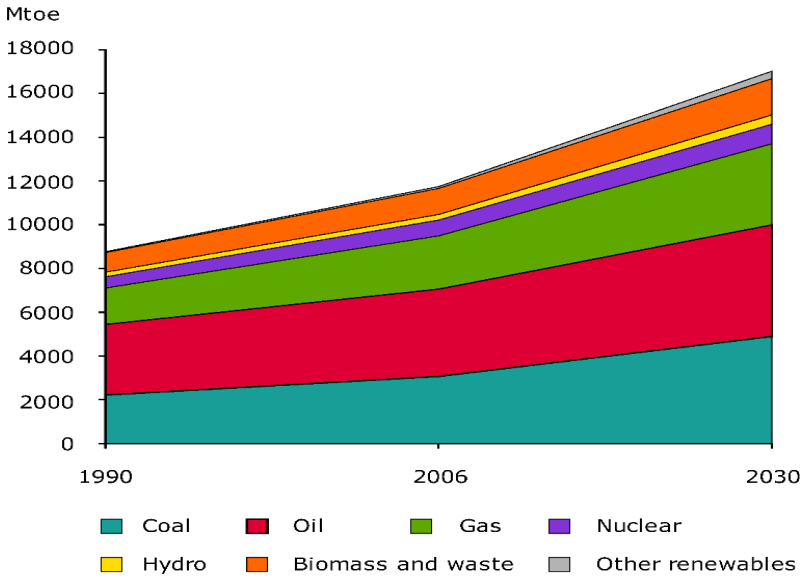

Figure 1. Energy Consumption by Source (EEA, 2012)

The energy profile in Figure 1 indicates two of the fundamental facts for early 21th century, namely: enormous growth in energy consumption and almost 90 reliance on fossils that result in CO2s, the predicament of heating Earth.

2. Humans and Energy

Energy is so essential to humans. All need its functions, and current total consumption of energy is roughly 70 Gigajoules per capita. Yet, the differences in per capita energy access are enormous.

Table 1. Per Capita Energy Consumption (BP, 2021)

	2010	2019
Africa	15,4	15,2
Asia Pacific	50,7	60,9
Australia	240,5	233,2
Brazil	56	58,9
China	76,2	99,1
Germany	169,6	156,3
India	18,2	24,8
Japan	164,2	144,8
Middle East	135,3	146,2
Russia	195,1	204,9
South Korea	218,3	239,1
Sweden	229,8	223,4
United States	300,7	288,4

A human needs about 10 mega joules per day to survive healthy, or 3,8 GJ annually.

3. Coal Power

COP22 tried to ban coal as energy source by 2030 against China and India's objections and ultimately veto. However, burnings of wood and charcoal without replanting give more CO2 emissions.

Countries that produce oil and gas for export have large CO2s. Per capita emissions are highest in Qatar (Figure 2).

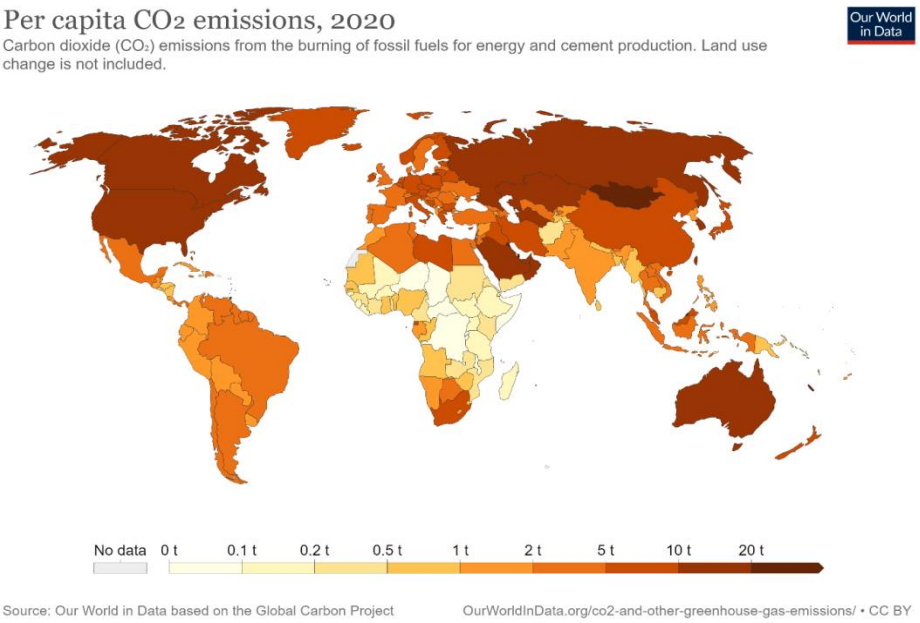

Figure 2. Per Capita CO2 Emissions 2020 (Our World in Data, 2021)

We have to look at China, United States and Russia to find huge total emissions. All suffer badly from environmental impact of fossil extraction.

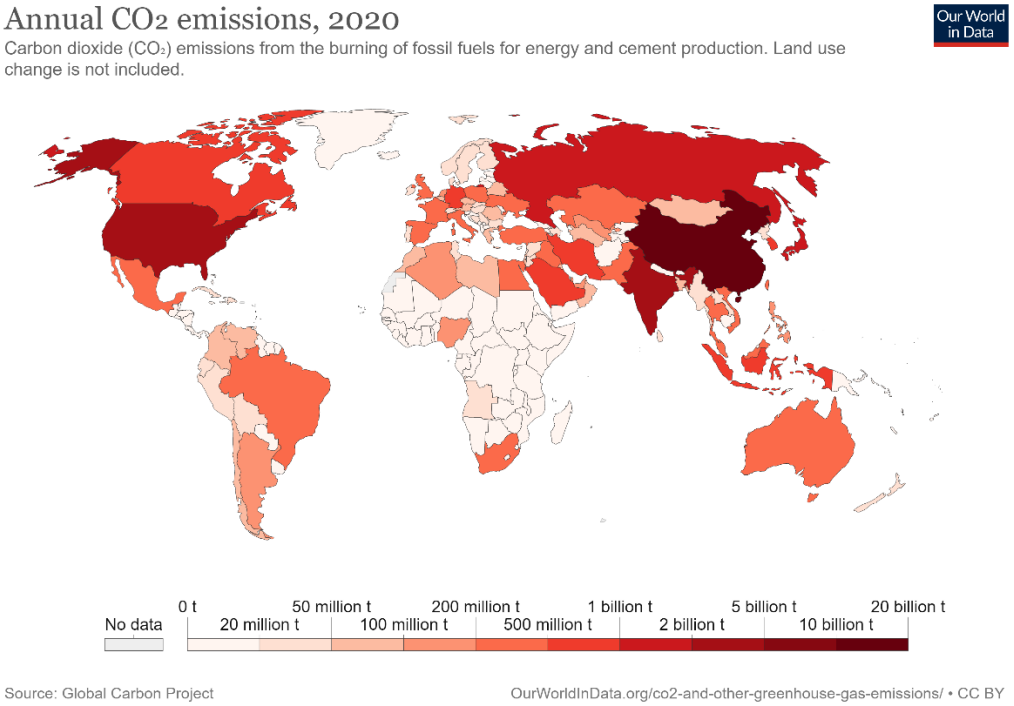

Figure 3. Total Annual CO2 Emissions 2020 (Our World in Data, 2017)

4. Fossils and Development

China and India

The energy situation in the most populous countries in the world is of great concern. It is not only that coal power makes up about half of total energy consumed – see Figure 4 and Figure 5.

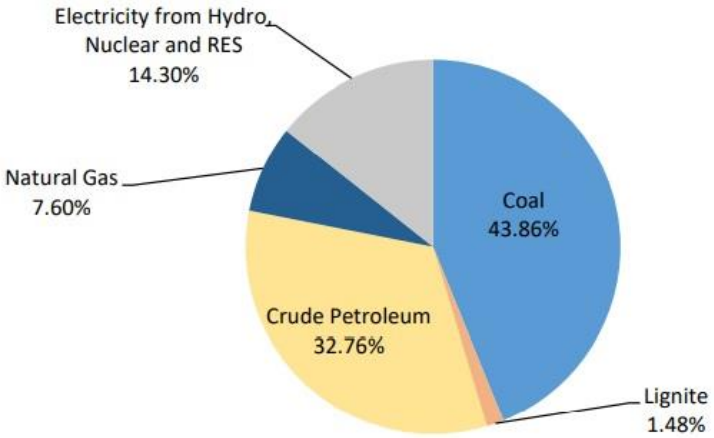

Figure 4. India Consumption of Energy 2019 (Energy India, 2021)

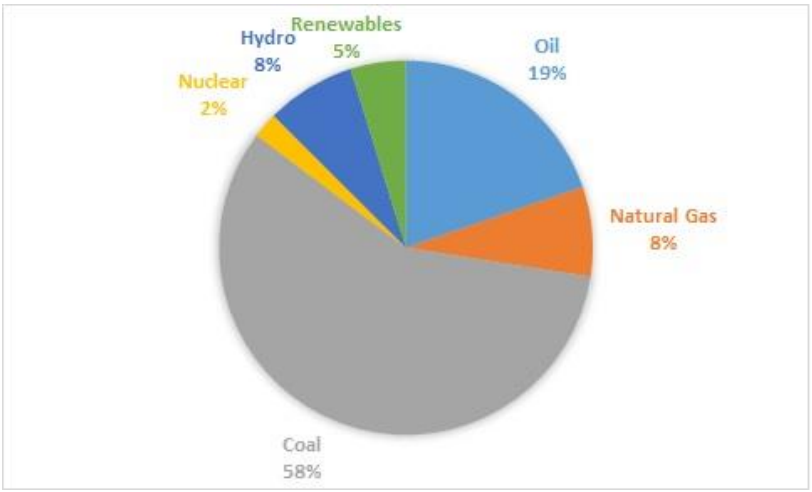

Figure 5. China Consumption of Energy 2019 (BP, 2021)

Although both countries have access to renewable power sources, coal and other fossil fuels dominate. In addition, the electric power in India and China is overwhelmingly produced by coal – see Figure 6 and Figure 7.

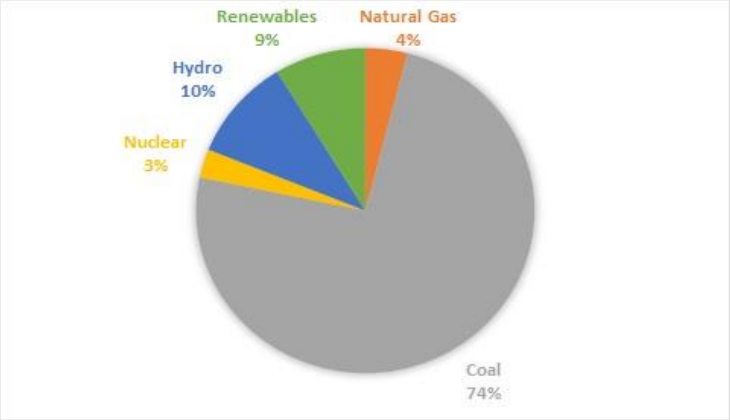

Figure 6. Electricity Production in India 2019 (BP, 2021)

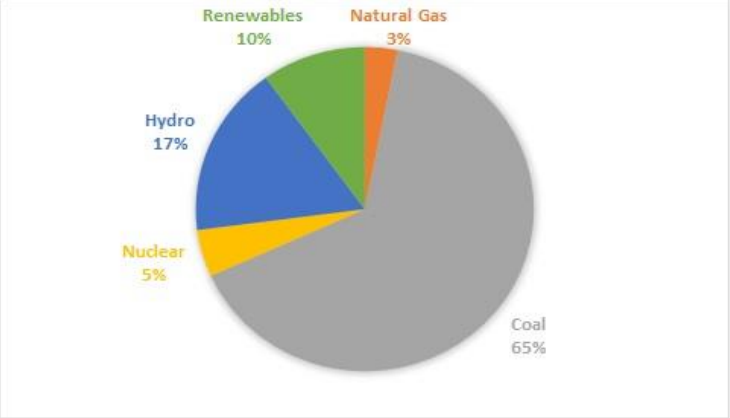

Figure 7. Electricity Production in China 2019 (BP, 2021)

Both countries face enormous challenges:

- Retrieve electricity from non fossils;
- Replace fossil fuel power with electricity;
- Increase total power supply considerably.

China says it can accomplish all these goals by 2050, whereas India wants a delay until 2060.

Qatar and Russia

Oil producing nations like Qatar and Russia and Nigeria are all heavily dependent on fossil fuels.

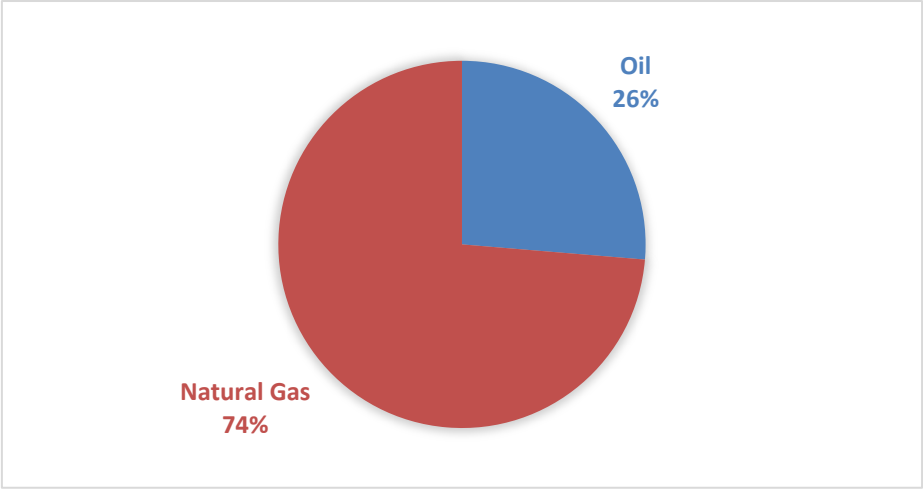

Figure 8. Primary Energy Consumption for Qatar 2020 (BP, 2021)

Qatar displays conspicuous consumption of energy, as it simply has too much. Besides exports Qatar offers its small population free electricity and water from desalination plants. These inefficiencies lead to CO2 emissions but the COP does nothing.

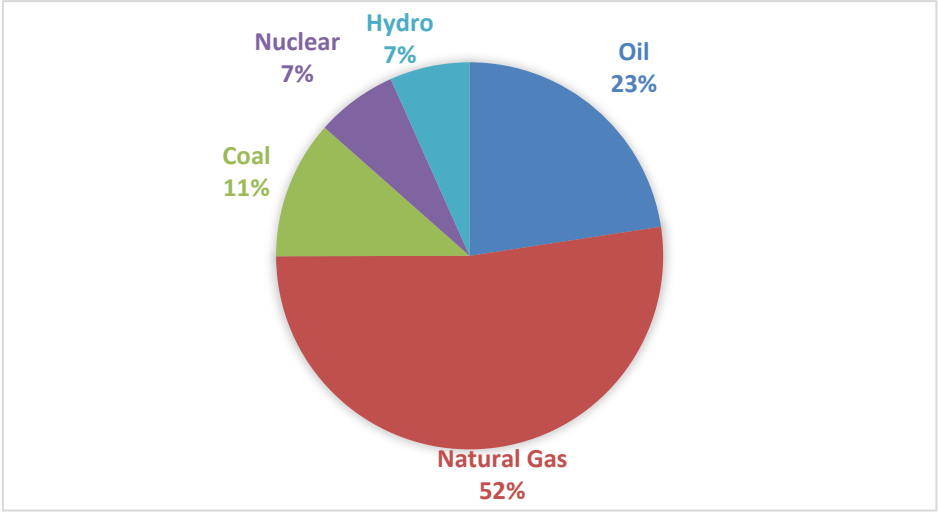

Figure 9. Primary Energy Consumption for Russia 2020 (BP, 2021)

The energy - ecology predicament in Russia is more subject of close monitoring and debate. Typical of the USSR was disrespect for the environment. Today Russia bets heavily upon fossils while its tundra softens releasing methane. Energy resources are most plentiful but their extraction has not generated as much citizen affluence as military power. Like Qatar, Russia prefers to rely upon its fossils, especially natural gas. The Russian government promises carbon neutrality by 2060, which is too late for the COP. How will Russia protect its Boreal forest?

Commons' tragedies: Brazil and Indonesia

Global warming is attended by a whole set of commons deteriorations linked somehow to each other. There are two countries in particular that worsen the climate and ecology of Earth. First, Brazil and Indonesia have not protected the rainforests that are the lungs of Earth. Second, both resort to massive employment of coal and other fossils despite hydropower. Figures 10 and 11 display their fossil dependence.

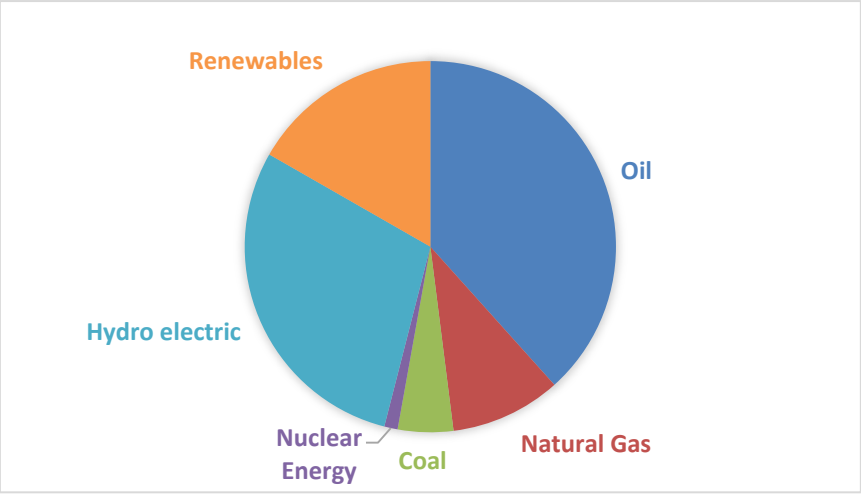

Figure 10. Primary Energy Consumption Brazil 2020 (BP, 2021)

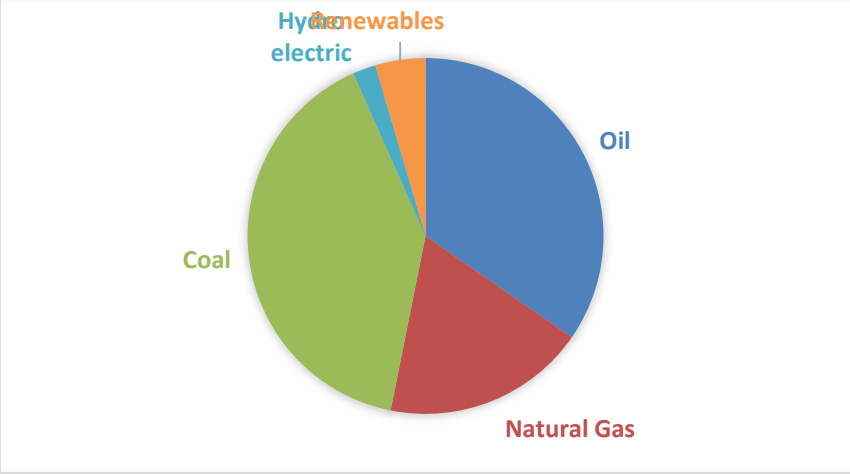

Figure 11. Primary Energy Consumption Indonesia 2020 (BP, 2021)

CO2s

The amount of CO2s in the atmosphere depends upon emissions of greenhouse gases and these depend upon the size and economic development of the country. Table 2 defines the 20 biggest emitters of CO2.

Table 2. CO2 Share of World Emissions by Country 2016 (Worldometers, 2021)

Country	Share of World emissions
China	29.18%
United States	14.02%
India	7.09%
Russia	4.65%
Japan	3.47%
Germany	2.17%
Canada	1.89%
Iran	1.80%
South Korea	1.69%
Indonesia	1.48%
Saudi Arabia	1.45%
Brazil	1.29%
Mexico	1.23%
Australia	1.16%
South Africa	1.09%
Turkey	1.03%
United Kingdom	1.03%
Italy	1.00%
France	0.93%
Poland	0.83%

The Keeling curve has increased by 2 percent per year since global warming was diagnosed by researchers at the NASA Goddard Space Center in 1988 (Hansen et al., 1988), driven by CO2 emissions. The amount of greenhouse gases has augmented sharply, driven by energy increases. The latter will not decrease. On the contrary, both greenhouse gases and energy consumption is up 2021 from 2020. Here is the crux of the matter. When global emissions go up 1%, the Keeling curve goes up 2%, It is all about energy. The demand for energy goes up year after year. Since 1990 the increase is 0,8 per cent, as illustrated in Figure 12.

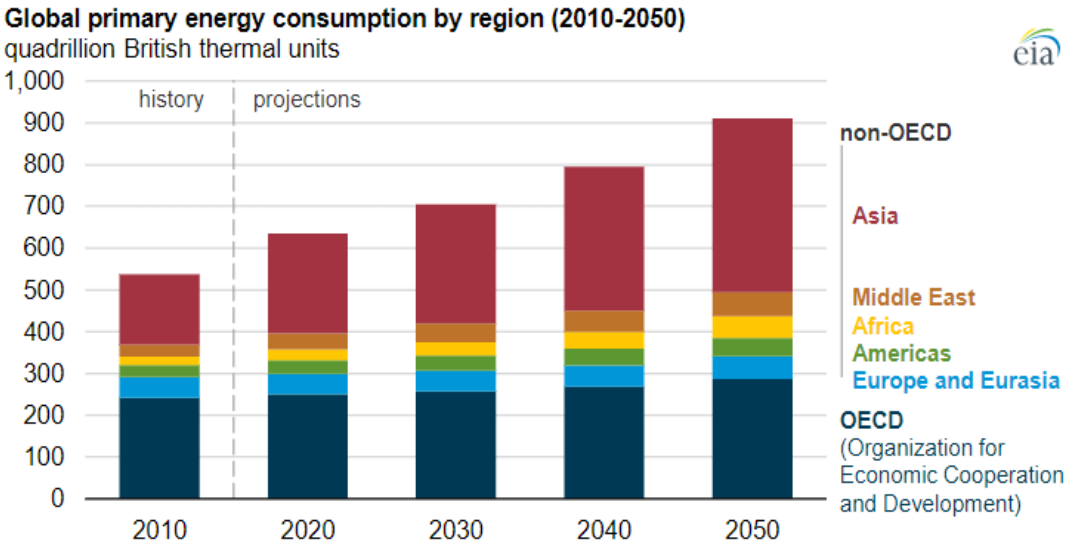

Figure 12. Projected Energy Demand 2020-2050 (EIA, 2021)

5. Conclusion

Since the demand for energy is still rising one understands why China and India as well as Qatar and Russia renege on the COP ambitions. In fact, all states in the COP club renege somehow because the demand for energy is overwhelming. Hawking was right stating large unavoidable climate change.

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