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Original Paper

Energy Consequences for Environment

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Abstract

The beginnings of this century sets up the dilemma of more energy or betterment of the environment. If "energy" is the capacity to do work, as often said, then it can be made profitable. If protecting the ecology of Earth is what the COP reunions of the UN aim at, then it is hardly a surprise that China and India reneged against the original formulation of phasing out coal power. Both countries use a lot of coal plants to get cheap energy for rapid economic development. This is dismal fact for COP endeavours. The efforts of the UN to create global ecology coordination will be harmed by the war in Ukraine, but how realistic is the 1.5 temperature goal anyhow?

Keywords

Climate change, Energy, Fossil fuels, Demand for the capacity

1. Introduction

It is trivial to state the humans use a lot of energy for their purposes, for survival and lifestyles besides the ever costlier armaments and occasional warfare. Much of this energy is derived somehow from nature. Most energy is delivered by Earth, which raises the problem of energy exhaustion. The sun energy is on such a scale that the problem is not exhausting but availability. Figure 1 shows the major kinds of energy today.

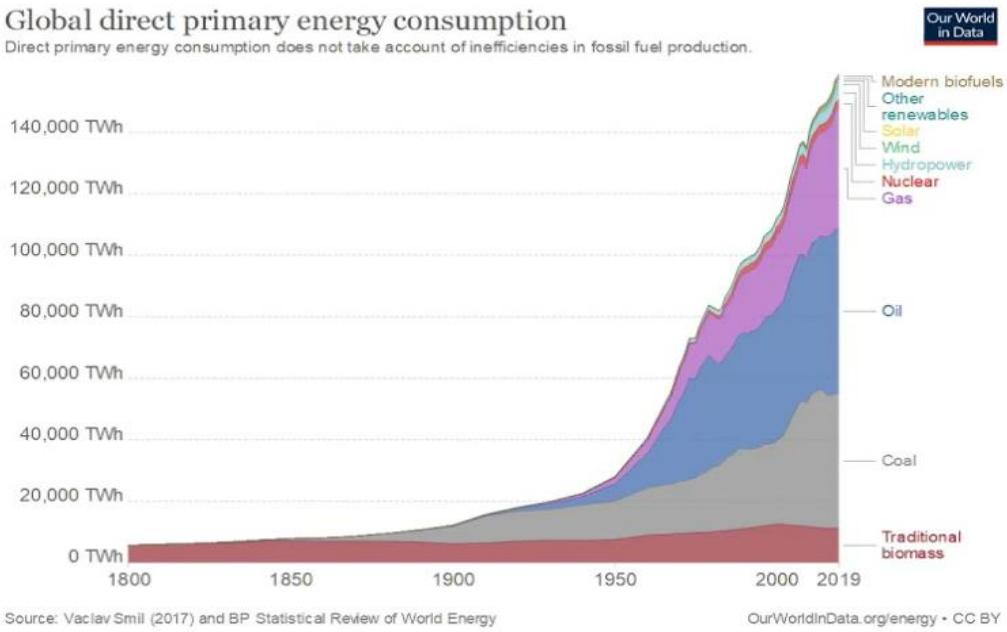

Figure 1. Energy Consumption by Source (Our World in Data, 2017)

The energy profile in Figure 1 indicates two of the fundamental facts for this century: a) Enormous growth in energy consumption; b) The almost 90 percent reliance on burning of energy resources.

Combining these factors, we arrive at the greenhouse predicament of heating Earth. We can follow this mechanism in operation by consulting the Keeling curve of CO2 emissions. Nature is rob of its resources and receives a heavy dose of pollution. This energy – environment conundrum mast be undone or mankind goes down under. Now when the Keeling curve stands at 420 units life on Earth is negatively affected.

2. Humans and Energy

Why energy is so essential to humans appears from Figure 2. All societies need these functions.

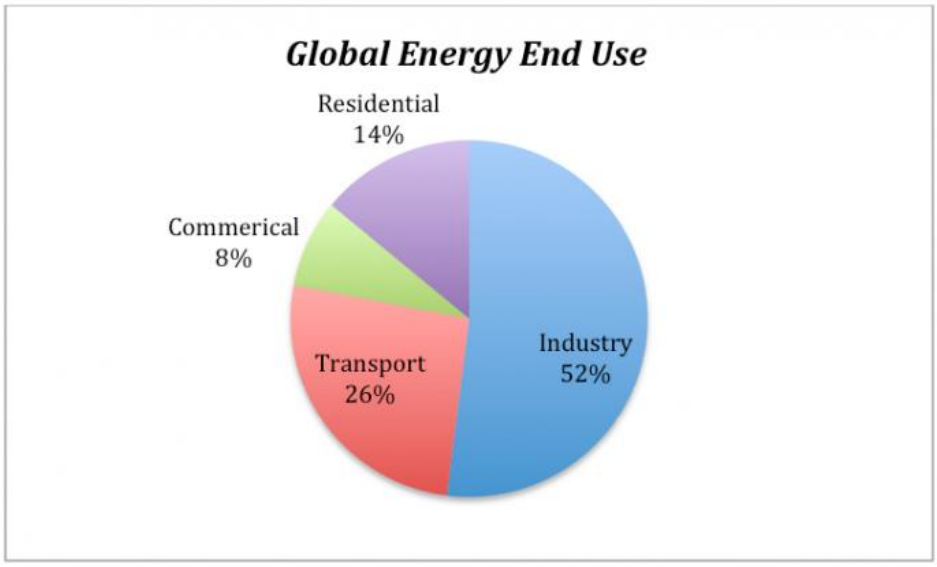

Figure 2. Energy End Usage by Sector (Bice, 2022)

Of course, different countries have their specific energy profile with regard to both Figure 1 and Figure 2. In fact, the variation in energy consumption in societies is immense, no doubt reflecting the GNP variation in per capita income.

Today total consumption of energy is roughly 70 Gigajoules per capita. Yet, the differences in per capita energy access are enormous – look at the following country numbers in Table 1.

Table 1. Per Capita Energy Consumption (Giga Joules Per Year) (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. Total energy per capita in Africa is only about 15 meaning risks of starvation as energy is needed for other purposes as well. On the contrary, the very high per capita energy number for the US entails a decent lifestyle for many and an exuberant one for the few very rich.

3. Coal Power in India and China

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 3 and Figure 4.

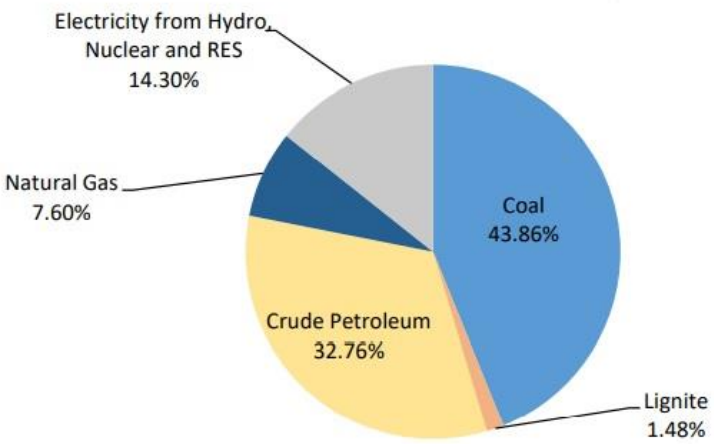

Figure 3. India Consumption of Energy 2019 (Energy India, 2021)

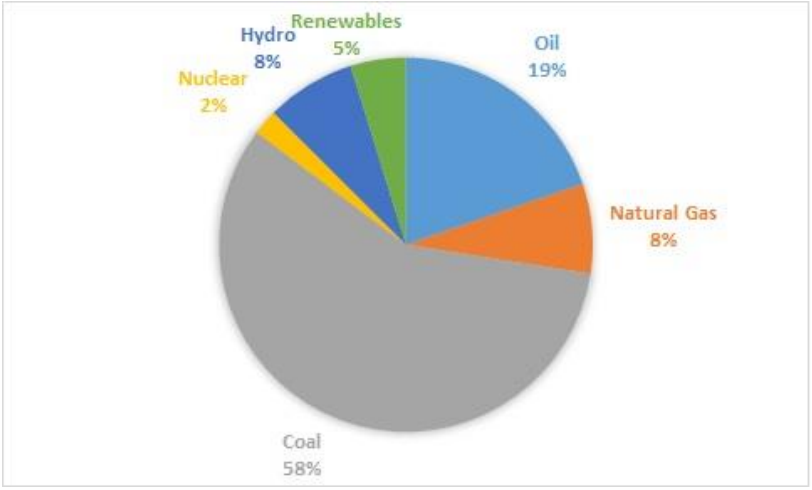

Figure 4. China Consumption of Energy 2019 (BP, 2021)

Although both countries have access to renewable power sources, coal and other fossil fuels dominate. They are projected to undergo rapid economic growth over the course of the 21st century (OECD 2018), drastically increasing demand for energy beyond already alarming levels. In addition, the electric power in India and China is overwhelmingly produced by coal – see Figure 5 and Figure 6.

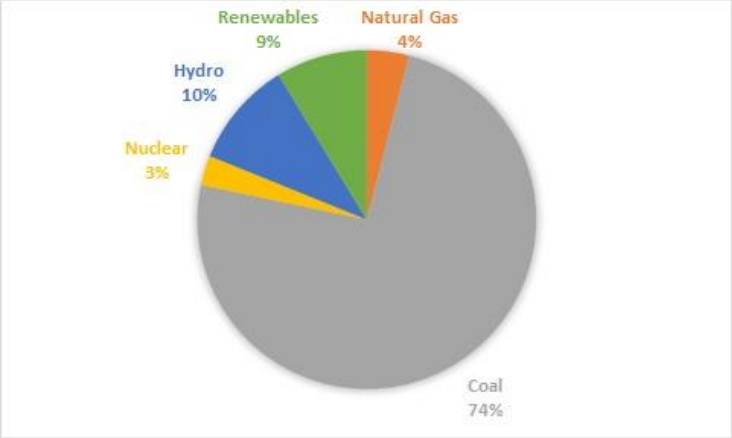

Figure 5. Electricity Production in India 2019 (BP, 2021)

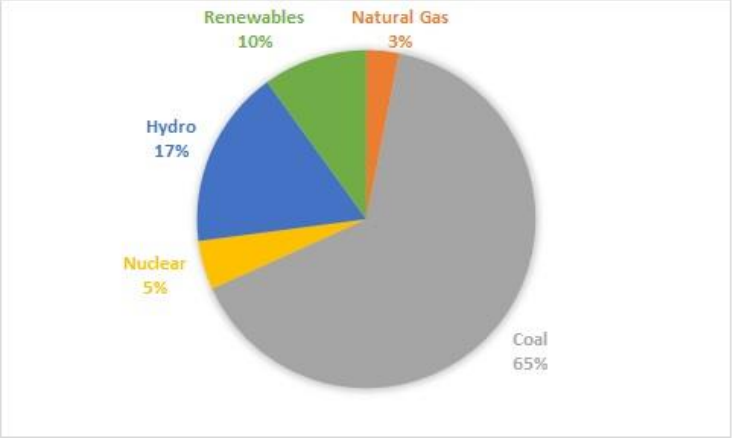

Figure 6. Electricity Production in China 2019 (BP, 2021)

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.

4. DOUBLE 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 7 and 8 display their fossil dependence.

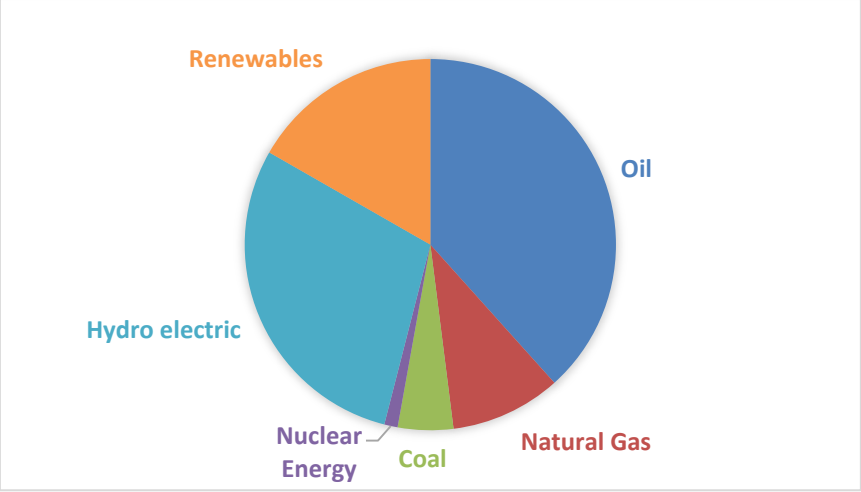

Figure 7. Primary Energy Consumption Brazil 2020 (BP, 2021)

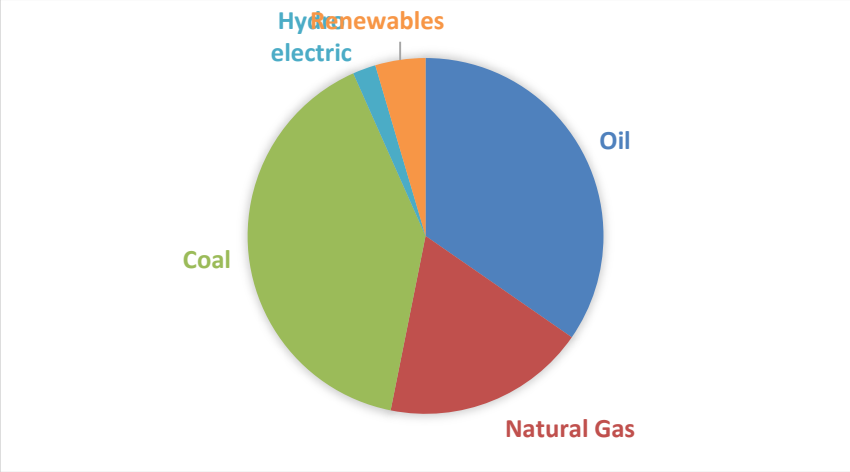

Figure 8. Primary Energy Consumption Indonesia 2020 (BP, 2021)

5. Fossils in a Medium Income and Superrich Country

If energy is looked upon as the driving force behind temperature rise, then the search for new energy sources must be main preoccupation for countries that are developing fast or have done so after the Second World War.

Mexico

The COP proposals of eliminating coal by 2030 and fossils by 2050 would require a complete restructure of energy sources. Figure 9 shows that by 2020 Mexico relies upon its fossils.

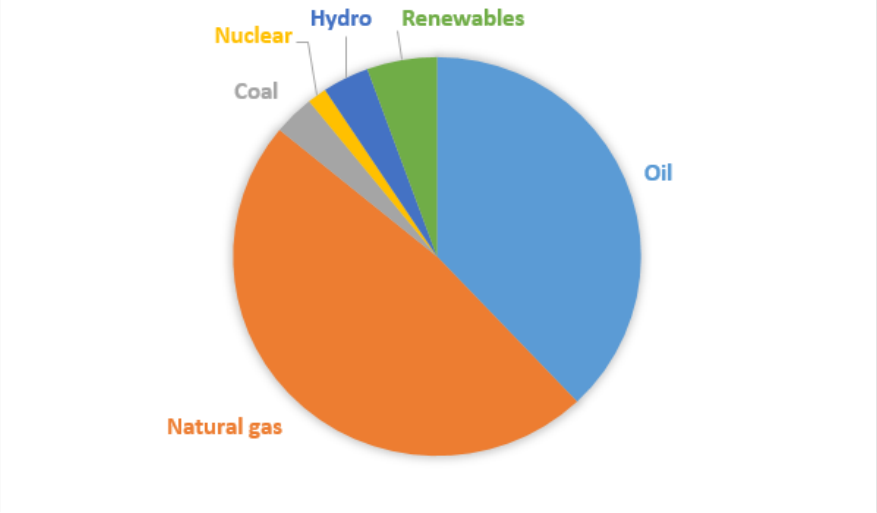

Figure 9. Energy in Mexico (BP 2021)

How is this near total fossil dependence to be replaced by renewable energy in a few decades? And will there be financial support from the promised Superfund? Many, many solar parks must be built taking lots of land. At the same time Mexico's population increases and government plans for huge energy augmentation.

Japan

But surely the turn to electric vehicles will mean a decisive improvement? No. It all depends on how electricity is produced. Burning fossils in order to get electricity is not ecologically friendly nor economical. Compare a most advanced economy, that of Japan (Figure 10):

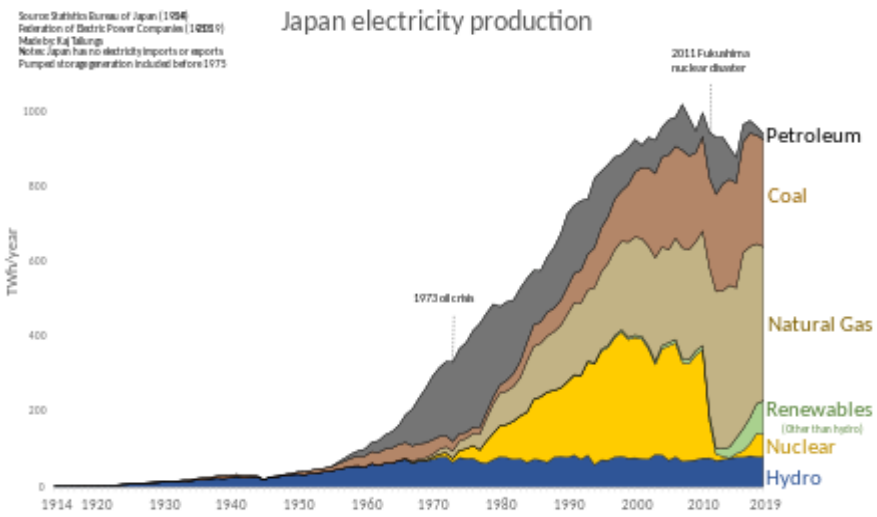

Figure 10. Electricity supply in Japan (Wikipedia, 2022)

Due to a drastic change in energy policy, Japan is more than ever dependent upon the import of fossils. When countries abandon energy sources they often run into energy shortages, which call for fossils. Yet, advanced countries plan for large energy increases. Japan with a shrinking population will rely upon improved energy efficiency ad well as biomass.

Is really biomass carbon neutral? It depends on replanting trees. In poor countries people simply take down trees to sell charcoal. Rich EU imports pellets from the US, hardly controlling replanting.

6. An Oceanic Club

The debate about climate change involves all aspects of ecological deterioration. Global warming on the other hand deals with greenhouse gases. To save nature globally lots of measures are necessary, while the global warming phenomenon has been attributed in particular to CO2 emissions.

The amount of CO2s in the atmosphere depends upon emissions of greenhouse gases and these depend upon the size and economic development. 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%

CO2s are only one kind of greenhouse gases. The so-called *Keeling curve* goes slowly upwards with the exception of 2020. Now it stands at about 420 ppm. Earth scientists and climate experts like the UN have demonstrated that this rise in the chief cause of temperature increase. Thus, the global club decided to start cutting the CO2s according to various promises: 2030, 2050 and 2060 on the assumption that temperature rise would stay between 1.5 and 2 degrees Celsius. The Keeling curve would level off at some point securing a sustainable solution for the conundrum. Is this likely? Once again negative based on the facts at hand.

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 per year (BP, 2021). Total energy supply is sharply up even when energy decarbonisation takes place. It is true that renewable energy sources have been put in place in many countries, bur fossil fuel energy still dominates much. The transition from coal, oil and natural gas occurs at the time as demand for energy 0augments. With the shift to electric cars and trucks the consumption of electricity will more or less skyrocket in many countries. Figure 11 shows some estimates of energy.

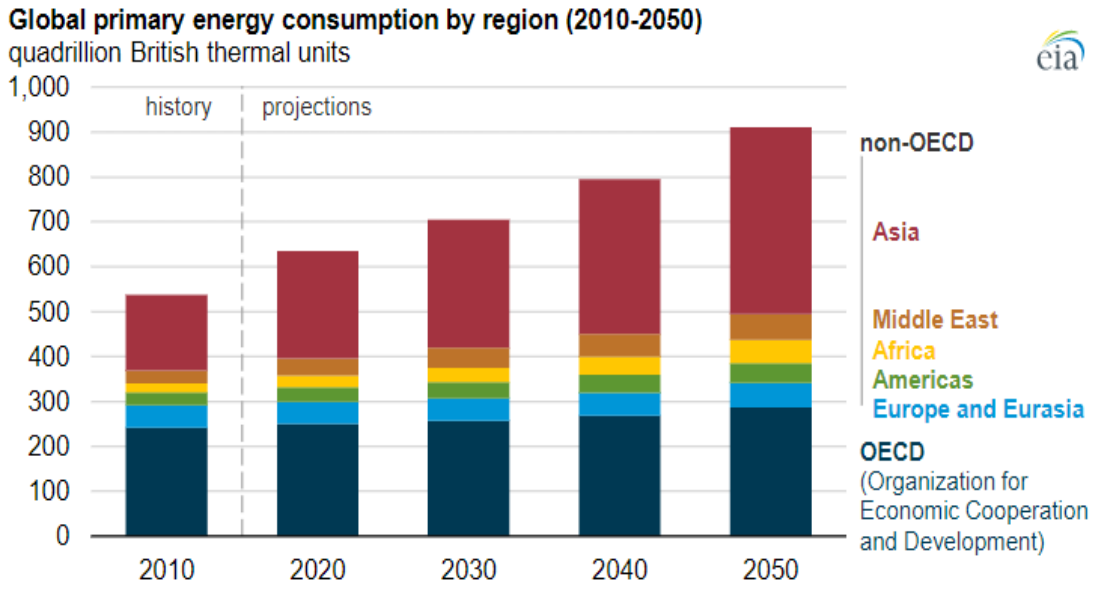

Figure 11. Projected Energy Demand 2020-2050 (EIA, 2021)

7. Conclusion

The *ecology crisis* of Earth is driven to a large extent by the insatiable demand for energy. Despite the rise in greenhouse gases governments plan for large increases in energy consumption. In February the *Intergovernmental Panel* on *Climate Change* IPCC published its most recent report, warning about the coming consequences of climate change and the lack of ecological policymaking around the world (IPCC, 2022). Today many governments have revealed plans for huge rearmaments including Germany. As world politics has been transformed with the Ukraine war, the prospects of global environmental policies in the COP CLUB of states appear even slimmer than right after Glasgow.

The importance of renewables has been recognised but fossils still play the major role. And coal in various forms dominate. At the same time the forest is diminished. This infernal logic of energy versus ecology threatens the existence of life on Earth.

References

Bice, D. (2022). *Global Energy Uses.* Penn State University. https://www.e-education.psu.edu/earth104/node/1346

British Petroleum (BP): *BP Statistical Review of World Energy. July 2021, 70th Edition*. https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html

Energy Information Administration (EIA): *International Energy Outlook 2021*. https://www.eia.gov/outlooks/ieo/

Energy Statistics India 2021. National Statistics Office, Ministry of Statistics and Programme Implementation, Government of India. http://www.mospi.nic.in/publication/energy-statistics-india-2021

Hansen, J., Fung, I., Lacis, A., Rind, D., Lebedeff, S., Ruedy, R., …Stone, P. (1988). Global climate changes as forecast by Goddard Institute for Space Studies three-dimensional model. *J. Geophys. Res.*, *93*, 9341-9364. http://doi.org/10.1029/JD093iD08p09341

Imasu, R., Tanabe, Y. Diurnal. (2018). Seasonal Variations of Carbon Dioxide (CO2) Concentration in Urban, Suburban, and Rural Areas around Tokyo. *Atmosphere*. *9*(10), 367.

IPCC. (2022). *Climate Change 2022: Impacts, Adaptation, and Vulnerability*. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (Eds.)]. Cambridge University Press. In Press.

OECD. (2018). GDP long-term forecast (indicator). http://doi.org/10.1787/d927bc18-en

Ostrom, Elinor. (1990). *Governing the Commons: The Evolution of Institutions for Collective Action*. New York: Cambridge University Press.

Our World in Data. (2017). *Energy*. http://www.ourworldindata.org/energy

UNFCCC: Conference of the Parties (COP). https://unfccc.int/process/bodies/supreme-bodies/conference-of-the-parties-cop

Wikipedia. (2022). Electricity sector in Japan. https://en.wikipedia.org/wiki/Electricity_sector_in_Japan

Worldometers. (2021). *CO2 Emissions by country*. https://www.worldometers.info/co2-emissions/co2-emissions-by-country/