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**Research Article**

# Influence Of COVID-19 On Socio-Economic And Renewable Energy Sectors: An Indian Scenario

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**ABSTRACT**

COVID-19 (CD) created an adverse influence on social, economic and renewable energy (RE) sector compared to the Pre-Covid scenario. The above mentioned sectors are interrelated and thus lockdown strategy and stay at home rules to reduce the CD transmission had a drastic effect on them. With lockdown, all sectors were closed, energy demand reduced greatly had a critical influence on energy generation in addition to deepen poverty and increase unemployment and the risks of hunger and food insecurity. The economic and social costs of the CD outbreak are therefore likely to be significant and long-lasting in India. However, there are positive influences as well. The decline in $CO_2$ emissions and growth in the RE industry as the cost of fossil fuels falls are both examples. The scenario of the RE sector after CD and the lessons learned from the influence of CD is presented in this paper as well.

**Key words:** COVID-19 (CD), renewable energy (RE), Socio, Economic, Energy.

## 1. Introduction:

CD is a contagious disease caused by a virus and was identified in Wuhan province of China in December 2019 **[1].** The disease quickly spread worldwide, resulting in the CD-pandemic. CD symptoms can range from one to fourteen days after viral contact and might include fever, cough, headache, breathing problems, loss of smell and taste **[2].** On January 9, 2020, World Health Organization [WHO] identified the mysterious cause of the disease is virus. On January 12, 2020, WHO officially accepted this rapidly spreading virus and labeled this disease as COVID (CO-Corona; VI-Virus; D-Disease; 19: year) **[3].** This epidemic disease was declared the sixth international public health emergency. To avoid the spread of CD, the Government of India (GOI) imposed one of the most restrictive lockdowns in history, beginning March 25, 2020, and prohibiting all "non-essential" economic, religious, and social activities **[4].** The Indian renewable industry is dealing with increased uncertainty as a result of the CD epidemic and subsequent lockdowns. The industry is grappling with declining demand for power, interruption of the supply network for under-construction solar and wind energy projects, labor shortages, delays in the delivery of equipment, and delays in the purchase of property as a result of the lockdown **[5, 6].** This work tried to highlight how CD in India creating a drastic influence on human social life, economy and secondary fields like RE.

## 2. Methodology

The comprehensive review of literature methodology is always improved over a normal review since it reveals gaps in studies and offers data on areas where the majority of the research has been conducted. As a result, the majority of the information was covered, comprising government records **[7,8,9]** rapid submissions, and many published research articles. It was also unclear at the moment how and for how long the worldwide impact would be active. Nevertheless, following the first modification and during the second submission, it was obvious that the influence of CD fully effective and compatible with past results.

## 3. Influence of CD

The spread of CD in India is determined by various epidemiological variables, as well as the timing, type and extent of actions implemented to prevent and control the disease. The epidemic has brought the entire planet to a halt. Many obstacles relating to social, educational, economic, political, agricultural, psychological, and other levels have been identified, which have had a terrible influence on people's life.

### 3.1 Influence of CD on Socio-Economic sector

CD brought about a number of changes in people's lives. To prevent the transmission, India implemented a lockdown technique as well as social separation **[10].** During the lockdown, individuals were instructed to stay at home and only go out if strictly essential and they were also instructed to wear masks and keep social distance in minimizing the spread **[11]** of pandemic virus. The strict lockdown exposed the pitiful circumstances of millions of migrant workers who were unable to find employment and were forced to return to their individual home villages and towns. The Central Bank of India (RBI) has forecasted GDP growth of 6.2% in 2019-20 **[12].** The International Monetary Fund, on the other hand, reduced India's growth prediction for 2019-20 by 1.3% points to 4.8% and noted that India's economy has slowed drastically **[13].** It follows that an economy already suffering from poor development in the prior fiscal year would be badly harmed by the pandemic-caused lockdown.
The common socio-economic impacts of CD are.

- **Social distancing and self-isolation:** Avoiding public gatherings, limiting the amount of visitors to your house, staying at home more often, ensuring a safe distance from other people, and spending up with friends and family digitally rather than in person are all examples of this **[14].**
- **Travel restrictions:** All passengers are required to download the Aarogya Setu App. Airlines Obligation: Guarantee that passengers do not board from the origin station unless they have a negative RT-PCR / True NAT / CBNAAT / Rapid Antigen Test result or the last vaccination certificate as specified in the health screening section **[15].**
- **Reduced workforce across all economic sectors:** The economy's development has slowed as a result of the closure of several industrial routes. The reverse flow of workers and the resulting labor shortage slowed economic development even more. As a result of India's economic shutdown, the labor force shrank from 433.8 million (383.4 million men, 50.4 million women) in March 2020 to 369.0 million (332.0 million men, 37.0 million women) in April 2020 **[16].**
- **Job loss:** The CD epidemic has provoked one of the most significant employment losses since the great recession. There is a significant risk that the crisis will exacerbate poverty and worsen disparities, with long-term consequences **[17].**
- **School closure:** In 2021-22, enrollment in school education from kindergarten to upper secondary is projected to reach approximately 25.57 crores. This is 19.36 lakh more students than enrolled in 2020-21. Enrollment in the school's pre-primary sections, on the other hand, declined by 11.5 lakh. In 2021-22, the total number of schools was 14.89 lakhs, down from 15.09 lakhs in 2020-21. According to the research, the closure of more than 20,000 schools is mostly the result of school closures under private and other management schools, as well as the grouping of government schools by different states **[18]**.
- **Increased need for medical supplies:** To maintain the general health of the community in India during the CD epidemic, Aarogya Seva will get medical supplies from diverse sources and deliver them to health groups dealing with disadvantaged people in need of general healthcare **[19].**
- **Increased demand in food sector:** Food service is India's worst-affected industry. Due to the lockdown, all foodservice outlets have closed their doors for dining. Food delivery is offered in limited quantities and accounts for less than 5% of foodservice sales. Utilizing the Department of Consumer Affairs (DCA) daily pricing statistics, the average retail price increases were over 6% for numerous pulses, over 3.5% for most edible oils, 15% for potato, and 28% for tomato **[20].**

### 3.2 Influence of CD on RE sector

"Energy" is used in our daily life and it is an essential component of any country that propels it forward social and economic advancement, as well as participation in people's lives. The disruptive nature of the Covid disease's spread has made it imperative for places to be placed under lockdown not only in India but throughout the world, making power projections a huge concern.

This has a direct impact on the RE sector **[21].** Aside from its limited supplies owing to its slow replenishing rate, the impact of fossil fuels on global warming and the increase in carbon dioxide ($CO_2$) is concerning.

India has taken steps to address this issue by encouraging the use of RE through several government programs. RE's such as solar, wind, hydro, and bio-fuels are considered as having the ability to replace themselves faster than they can be used.

RE, if properly implemented, has the potential to replace the country's reliance on fossil fuels due to its environmental friendliness and low $CO_2$. The chart-1 shows the anual change in RE generation relative to the previous year, measured in terawatt-hours (TWh).

This is the sum of energy from hydropower, solar, wind, geothermal, wave and tidal, and bioenergy. It is observed that, the anual change in RE in years 2019, 2020 and 2021 are +28TWh, -76TWh and +16TWh respectively **[8]**.

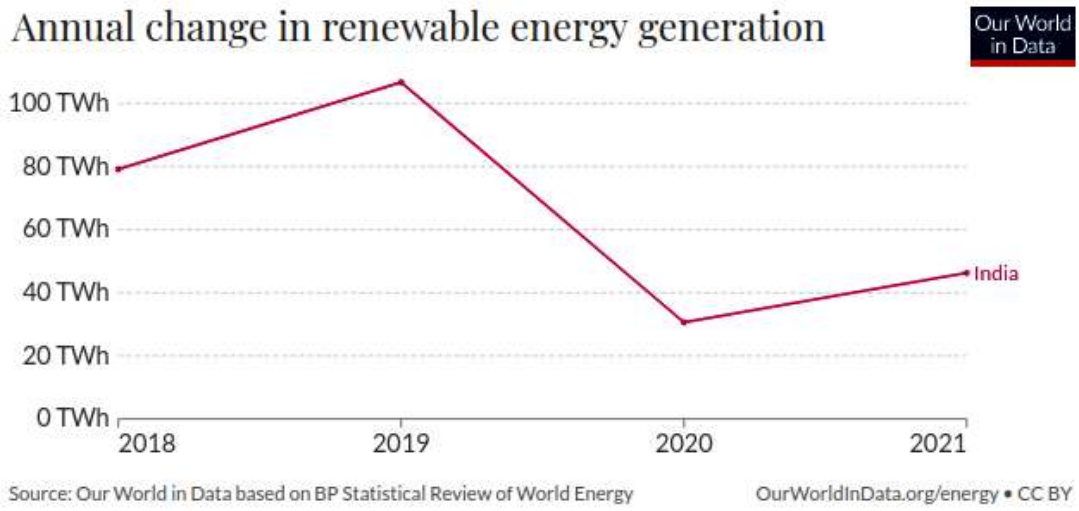


**Chart-1**

### 3.2.1 Influence of CD on hydro-power generation.

Hydro power is one of the most commercially developed RE source. This energy source can often be more reliable than solar or wind power. The Eastern region is rich in coal reserves and the Northern region has the country's highest hydro-power potential and capacity. The hydro-power generation proportion to total electricity generation was 9.84% in 2018-19, 11.26% in 2019-20 and 11.62% in 2020-22. Reduced overall generation due to Covid Pandemic was also a reason for increased proportion of hydro-power generation to total generation in 2019-20, 2020-21 and 2021-2022 **[22].** The annual change in hydro-power generation in India in 2019, 2020 and 2021 are 57TWh, 3TWh and -10TWh respectively. The chart-2 shows the annual change in hydro-power generation relative to the previous year measured in (TWh) **[8].**

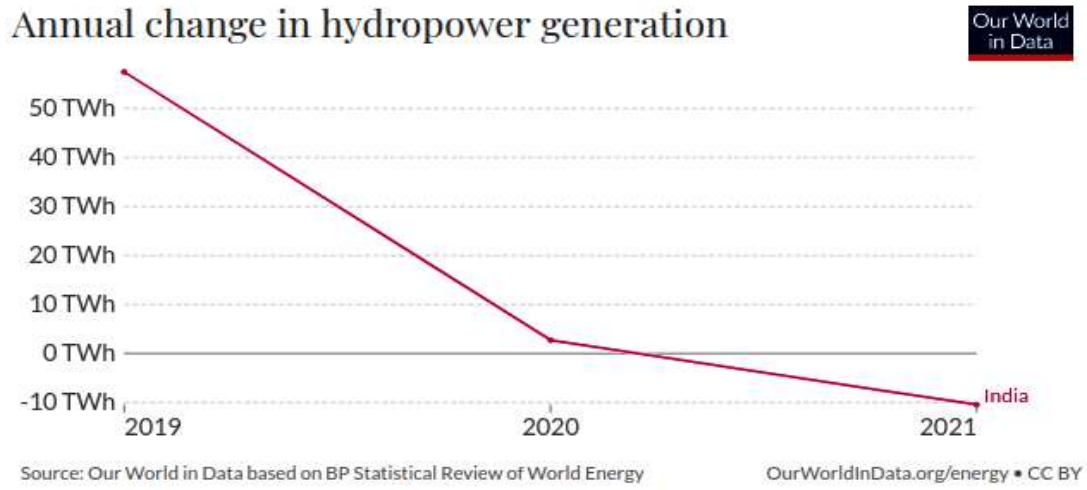


**Chart-2**

### ii) Influence of CD on solar energy generation.

Solar energy is the Earth's cleanest and most plentiful source of energy. India has the world's fifth greatest installed capacity of solar electricity. In 2019, India deployed 7.3 GW of solar power all over the country, strengthening its position as the world's third-largest solar market. India had 35 GW of installed solar capacity as of April 2020, which is well below the aim of 100 GW by 2022 **[23].** The installation of just 720 MW of solar projects in Q1 2020 drastically reduced the solar market. This is around 60-70% less than the preceding four quarters' new solar installations (which averaged around 2-3 GW). Prior to CD, CY 2020 was expected to be a boom year for solar installation in India. Nevertheless, due to the present crisis, around 3 GW of solar (whose planned commissioning date was 2020) are likely to be postponed. According to updated forecasts, only roughly 5.5 GW of additional solar power would be installed in CY 2020 **[24].**

The CD has had an effect on every sector of the economy, as well as the solar energy industry. Current solar projects have been stopped, and developers are concerned about cost increases caused by a domestic lockout and production reduction in China. Because imports from China fulfill 80% of its requirements, trade restrictions are impeding imports and making further development difficult. Approximately 85% of solar project workers are migrants, many of whom have returned to their home states owing to lockouts. As a result, the solar industry is facing a severe manpower crisis **[25].** The annual change in solar power

generation in India in 2019, 2020 and 2021 are 26TWh, 32TWh and 25TWh respectively. The chart-3 shows the annual change in hydro-power generation relative to the previous year, measured in (TWh) **[8]**.

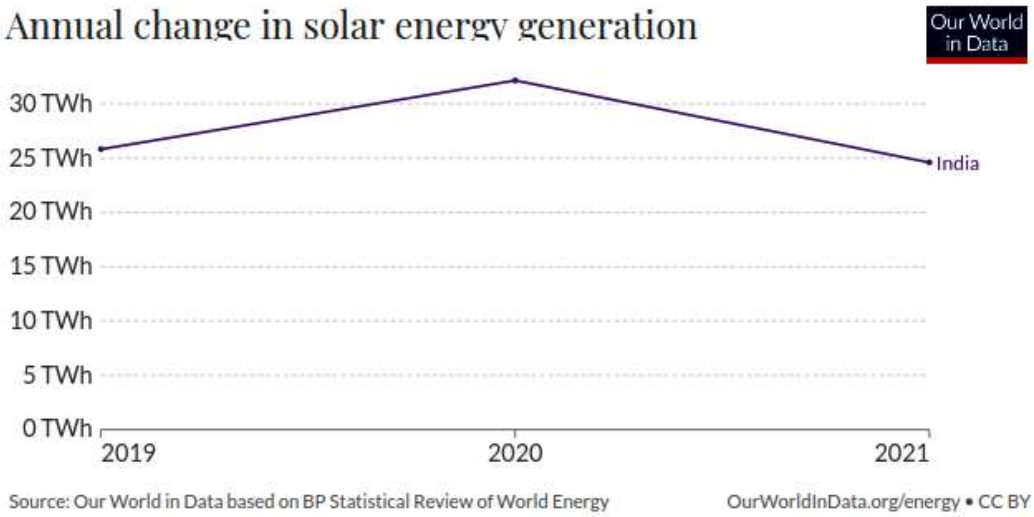


**Chart-3**

### iii) Influence of CD on wind energy generation.

Wind energy is a free and easily accessible RE source. Wind turbines capture the wind's energy and convert it to electricity every day all around the country. India is the world's fourth largest producer of wind energy. Through March 2021, the country has a total installed capacity of 39 GW. Wind energy fell considerably in the first quarter of 2020, with only 188 MW added. This is around 60-70% less than new wind installations (average 2-3 GW) in the preceding four quarters. Prior to CD, Calendar year (CY) 2020 was expected to be a boom year for wind projects in India. Nevertheless, due to the present crisis, around 2.5 GW of wind projects (with a planned completion date of 2020) are likely to be postponed. According to updated predictions, only roughly 1.5 GW of wind power might be added in CY2020 **[26]**.

The fourth quarter of fiscal year 2019 witnessed a 2.3% rise to 575 MW. The country's installed capacity fell by 67.2% in the first quarter of CY 2020, with only 189 MW installed. The 67.2% drop in Q1 of CY 2020 can also be ascribed to the advent of the Corona pandemic, and the devastating economic impact of the fatal virus will be properly assessed in the coming months. The World Wind Energy Council just issued a new analysis that examines how CD is affecting the global wind business, including India. According to the report, in order to comply with the Indian shutdown, both local and foreign turbine original equipment manufacturers and component manufacturers have temporarily ceased manufacturing in India **[27].** The annual change in wind power generation in India in 2019, 2020 and 2021 are 7TWh, -8TWh and 19TWh respectively. The Chart-4 shows the annual change in wind power generation relative to the previous year, measured in (TWh) **[8]**.

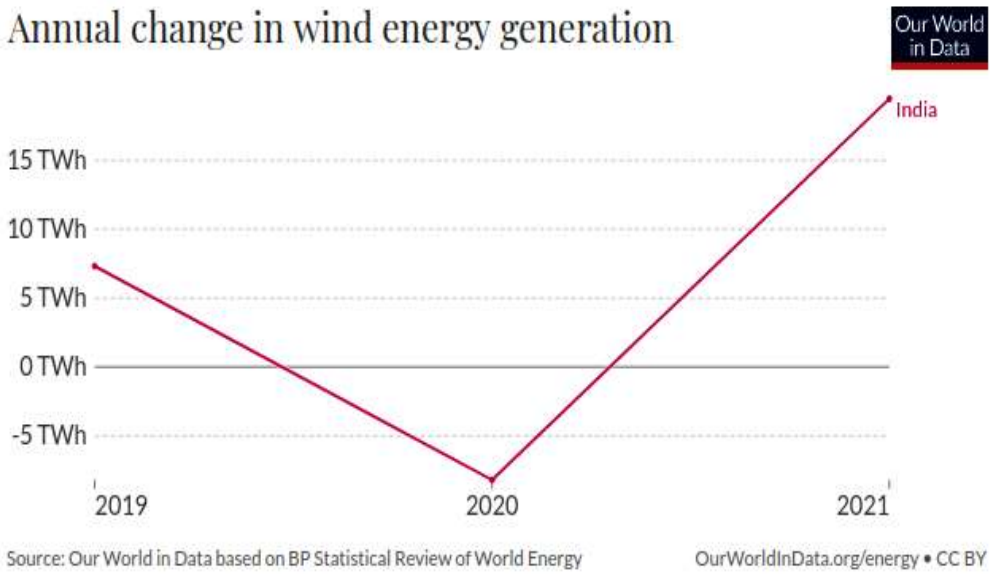


**Chart-4**

### iv) Influence of CD on Biofuel generation.

Bio fuels such as ethanol and bio-diesel are becoming increasingly popular as alternative and sustainable energy sources. Because of its clean-burning and domestically generated qualities, biodiesel in particular is proving to be a potential sustainable option for traditional petrol fuel. Biofuels are strategically important in India because they align with the government's ongoing initiatives like Make in India, Swachh Bharat Abhiyan, Skill Development, and provide an ideal opportunity to integrate with the specific goals of doubling farmers' income, reducing imports, creating jobs, and turning waste into wealth **[28].** From 2010 to 2019, ethanol and bio diesel output climbed rapidly. Ethanol production climbed at a compound annual growth rate of 2.4%, peaking at almost 110 billion litres in 2018-19 and accounting for 60% of global liquid bio fuel output. Nevertheless, lower demand and supply-chain concerns caused by the CD pandemic in 2020 resulted in an 11% drop in ethanol output. In 2019, bio diesel output was estimated to be approximately 47.4 billion liters **[29].** Production volume of bio diesel in India in 2019, 2020, 2012 and 2022 year 230, 200, 180 and 185 million liters respectively **[30]** and it is depicted in Chart-5.

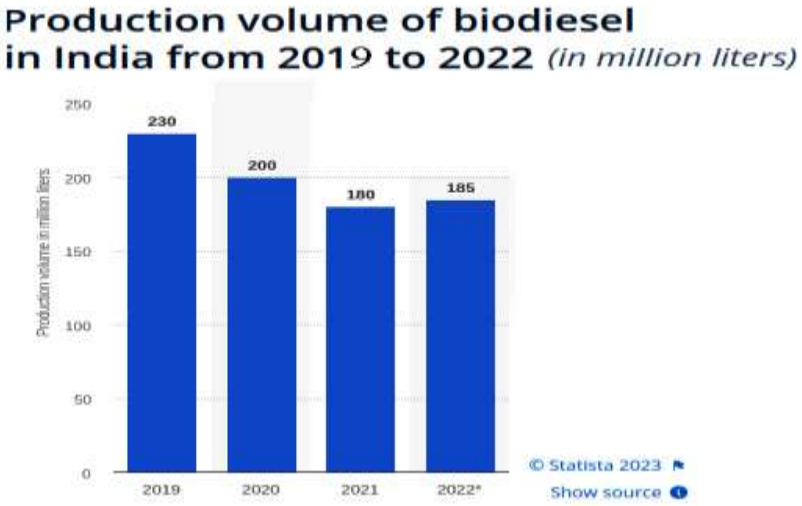


**Chart-5**

## 4.Conclusion

The Pandemic Coronavirus is having a significant influence on people's lives in general. Everyone on the planet is directly or indirectly affected by the disease's severe impacts. The Indian government has closed all schools, colleges, universities, pubs, markets, malls, and shopping complexes. Lockdown caused profound changes in the human mentality and social life. Home isolation causes a number of other concerns such as social anxiety, panic episodes due to uncertainty and significant mental stress. Due of the lockout and absolute closure of the key industrial sectors, it produced a downturn in the economy, job losses, financial uncertainty, and most likely a recession in the near future. Some of the few good effects of the pandemic epidemic have included improved air quality, cleaner seas, higher plant growth due to improved air and water availability, and flourishing animals. The effects of the CD epidemic in India on the RE sector are studied in this paper. Due to the projected continuous interruptions caused by the CD epidemic, India's renewable power sector is expected to decline significantly in 2020-21. This RE sector's recovery would be dependent on the revival of economic activity.

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