

India's Falling CO₂ Emissions – Is It a Flash in The Pan?

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Abstract- Lately, India's CO₂ or carbon di oxide emissions have been falling slowly but steadily. The question that immediately arises as a result is whether it is a flash in the pan or is something that can be maintained over a long period. This can be verified by examining the possible reasons behind the fall in CO₂ emission levels. The researcher pointedly interacted with two respondent groups strongly associated with the topic. They are corporate executives and investors. Two reasons stand out in the revelations the two categories made to the researcher – one, stakeholders mandate businesses to integrate environmental concerns with their management strategy and two, there has been a gradual rise in energy generation from renewables in the country. They have cited other, perhaps less significant, reasons as well. The interaction with the respondents led the researcher to conclude that it is not fair to detract fully from the country's achievement in the carbon emission space given that it is well poised to honour its two commitments under the Paris Agreement in terms of generation of electricity from non-fossil sources and reduction in the intensity of carbon emissions. With the country raising its solar energy capacity 12x since 2014 and launching initiatives to conserve electricity, the optimism surrounding the fulfilment of its commitment under the Paris Agreement is justified.

Key words: CO₂ emissions; detract; flash; fossil; non-fossil; pan; renewables; solar energy.

I. INTRODUCTION

1.1 Theoretical background of the topic

In the absence of external intervention, businesses and individuals are seldom motivated to minimise their carbon emissions. They may take the liberty to pollute for granted. After all, sustaining higher levels of production and consumption will improve their bottom lines and outweigh the costs they inflict on society (Si, 2020). To ensure accountability, carbon emissions are priced through a carbon tax or carbon trading. The latter is popularly called 'cap-and-trade' programs. Here, a certain level of total emissions is targeted, followed by allocation of emission permits across polluting businesses. Businesses that pollute

beyond the assigned levels must purchase appropriately additional permits from businesses that pollute below the assigned levels. India is now the planet's third-largest emitter of carbon dioxide (Slater, 2020). All the same, it is way behind China, the world's largest emitter, and the United States. India's per capita emissions are ranked 140th in the world (the United States is 14th and China is 48th). But India's emissions are set to rise in the future given that economic growth raises the demand for energy. The latest estimates reveal that that emissions in India grew 1.8 percent in 2019, much slower than it did in 2018. This is attributed the tardy economic growth.

1.2 Statement of the problem

Lately, India's CO₂ or carbon di oxide emissions have been falling slowly but steadily. Some take the statement with a pinch of salt while some find nothing strange about the statement. They believe that enhanced focus on renewable sources and increasing attention being paid by Indian businesses to carbon emission concerns have, among other things, triggered the fall. In the circumstances, an objective analysis will help in finding the answer to the question.

1.3 Review of literature

The following paragraphs briefly review the previous studies on the topic and the significant findings they have arrived at. They summarise the status of knowledge in the investigation. They eventually identify the research gaps that obtain in the review before embarking on bridging the gap. The intention is to "locate the present research in the existing body of research on the subject and to point out what it contributes to the subject" (Krishnaswami, Ranganatham, & Harikumar, 2016).

1. Daily carbon emissions worldwide fell by a significant 17 percent during the coronavirus pandemic, what with economies buckling under

the impact of lockdowns, asserts scientists (Slater, 2020). But experts argue that such an impact on emission levels is likely to be short-lived. According to one estimate, India's carbon dioxide emissions fell by 30 percent in April 2020 compared with the April 2019 level, cite the analysts at the website Carbon Brief. Pollution slid steeply, exposing the New Delhi residents to blue skies.

2. India's CO₂ emissions have fallen for the first time in four decades, not necessarily because of the coronavirus-led lockdown (Justin, 2020). Reduction in use of electricity and competition posed by renewables has dented the demand for fossil fuels even before the coronavirus arrived, according to the environmental website, Carbon Brief. However, it is the abrupt nationwide lockdown of March 2020 that retarded the country's 37-year-old upward trajectory of emissions. The website adds that Indian carbon dioxide emissions fell 15 percent in March 2020 and may have fallen by 30 percent in April 2020. The fall in power demand can be traced to coal-fired generators and that explains why the reduction in emissions has been so quick and so steep.
3. The researchers investigate the underlying drivers of changes in greenhouse gas emissions in India (JONAS, JOYASHREE, BARUN, GLEN, & ROBBIE, 2020). They use several complementary approaches for the purpose. They base their emission projections on India's Intended Nationally Determined Contributions and compare them with a range of emission scenarios. The projections reveal sustained economic growth leading to a rise in energy use. Further, they revealed that the per capita emissions might rise by 40 percent by 2030. They admit that new technologies may reduce energy consumption and emissions growth. They conclude that to slow down the growth of emissions further, India's energy sector will require massive decarbonisation.

1.4 Research gap

The findings of the learned researchers are as enlightening as they are varied. However, an analysis of the possible reasons behind the slow but steady fall

in India's CO₂ emissions would have complemented their otherwise valuable research. It is this gap the present study proposes to bridge.

1.5 Scope of the study

The study confines itself to the two major stakeholder categories associated with the carbon markets, namely corporate executives numbering 50 and investors, numbering 50.

1.6 Objective of the study

The objective of the study is to ascertain the possible reasons behind the slow but steady fall in India's CO₂ emissions

1.7 Hypothesis proposed to be tested.

The study proposes to test the following hypothesis:

“Stakeholders mandating businesses to integrate environmental concerns with their management strategy is a possible reason behind the slow but steady fall in India's CO₂ emissions”.

1.8 Research design

The following paragraphs explain how the research is designed.

1.8.1 Research methodology

The study is descriptive in nature since it is a 'fact-finding' investigation, aided by adequate interpretation. It focuses on certain aspects of the stated problem that can be expressed unequivocally. It gathers descriptive information. The study is also analytical to an extent since it tests hypotheses and specifies and interprets relationships. Unlike a descriptive study, it employs advanced statistical techniques like chi-square test (Krishnaswami, Ranganatham, & Harikumar, 2016).

1.8.2 Sources of data

Data required for the research has been collected from primary and secondary sources. Primary data has been collected from corporate executives, numbering 50 and investors, numbering 50.

1.8.3 Sampling plan

The researcher employed the non-probability sampling technique owing to non-availability of

some population elements for collection of data, etc. The study seeks to feel the range of conditions or the nature of the phenomenon. Time constraints and the time limit for completing the study precluded the application of the probability sampling technique. Under the non-probability sampling technique, the researcher chose the purposive or judgement sampling method since it guarantees the inclusion of all the relevant elements in the sample. Probability sampling plans cannot give such a guarantee (Krishnaswami, Ranganatham, & Harikumar, 2016). The researcher settled for two categories of respondents, namely, corporate executives, numbering 50 and investors, numbering 50.

1.8.4 Data collection instruments

Interview schedules, specially designed for the purpose, were drafted and pre-tested to identify the possible weaknesses in the instrument. Upon receipt of feedback, they were appropriately revised and finalised, for administration to the respondents for collection of primary data.

1.8.5 Data processing and analysis plan

The data collected was tabulated, interpreted, and statistically analysed. The researcher used Microsoft's spreadsheet programme, namely, MS-

Excel 365 for data analysis, reporting and deployment.

1.8.6 Limitations of the study

Primary data has at times been deduced by engaging with the respondents on the subject. It is possible that a certain degree of subjectivity, albeit negligible, has found its way in. But the researcher is convinced that it will not affect the accuracy of the findings of the study.

1.9 Analysis of primary data collected from the 50 corporate executives.

In the following paragraphs, the primary data collected from the 50 corporate executives is analysed.

1.9.1 Possible reasons behind the slow but steady fall in India's CO2 emissions

Lately, India's CO2 emissions have been falling slowly but steadily. In the circumstances, the researcher sought to know from the respondents the possible reasons behind the development. Their replies to the query appear in the following Table.

Table-1
Possible reasons behind the slow but steady fall in India's CO2 emissions

Possible reasons	Number of respondents
Covid-19-driven nationwide lockdown	37
Falling coal consumption	32
Stakeholders mandating businesses to integrate environmental concerns with their management strategy	32
Falling oil consumption	30
Slow but steady fall in exploitation of electrical energy by businesses	28
Gradual rise in energy generation from renewables	25

Covid-19-driven nationwide lockdown is cited as a reason by 37 respondents. Falling coal consumption is cited as a reason by 32 respondents. Stakeholders mandating businesses to integrate environmental concerns with their management strategy is cited as a reason by 32 respondents. Falling oil consumption is cited as a reason by 30 respondents. Slow but steady fall in exploitation of electrical energy by businesses

is cited as a reason by 28 respondents. Gradual rise in energy generation from renewables is cited as a reason by 25 respondents.

1.10 Analysis of primary data collected from the 50 investors.

In the following paragraphs, the primary data collected from the 50 investors is analysed.

1.10.1 Possible reasons behind the slow but steady fall in India's CO₂ emissions

Lately, India's CO₂ emissions have been falling slowly but steadily. In the circumstances, the

researcher sought to know from the respondents the possible reasons behind the development. Their replies to the query appear in the following Table.

Table-2
Possible reasons behind the slow but steady fall in India's CO₂ emissions

Possible reasons	Number of respondents
Stakeholders mandating businesses to integrate environmental concerns with their management strategy	42
Covid-19-driven nationwide lockdown	41
Falling coal consumption	35
Slow but steady fall in exploitation of electrical energy by businesses	34
Falling oil consumption	33
Gradual rise in energy generation from renewables	30

Stakeholders mandating businesses to integrate environmental concerns with their management strategy is cited as a reason by 42 respondents. Covid-19-driven nationwide lockdown is cited as a reason by 41 respondents. Falling coal consumption is cited as a reason by 35 respondents. Slow but steady fall in exploitation of electrical energy by businesses is cited as a reason by 34 respondents. Falling oil consumption is cited as a reason by 33 respondents. Gradual rise in energy generation from renewables is cited as a reason by 30 respondents.

1.11 Summary of findings

In the following paragraphs, a summarised version of the findings arrived at, by analysing the primary data furnished by respondents, is furnished:

1.11.1 Corporate executives

1. Covid-19-driven nationwide lockdown is cited as a reason by 37 respondents. Falling coal consumption is cited as a reason by 32 respondents. Stakeholders mandating businesses to integrate environmental concerns with their management strategy is cited as a reason by 32 respondents. Falling oil consumption is cited as a reason by 30 respondents. Slow but steady fall in exploitation of electrical energy by businesses is cited as a reason by 28 respondents. Gradual rise in energy generation from renewables is cited as a reason by 25 respondents.

1.11.2 Investors

2. Stakeholders mandating businesses to integrate environmental concerns with their management strategy is cited as a reason by 42 respondents. Covid-19-driven nationwide lockdown is cited as a reason by 41 respondents. Falling coal consumption is cited as a reason by 35 respondents. Slow but steady fall in exploitation of electrical energy by businesses is cited as a reason by 34 respondents. Falling oil consumption is cited as a reason by 33 respondents. Gradual rise in energy generation from renewables is cited as a reason by 30 respondents.

1.12 Conclusions

Conclusions are inferences / generalisations drawn from the findings and relate to hypotheses. They are answers to the research questions or the statements of acceptance or rejection of hypotheses.

As explained already, this study proposes to test the following hypothesis:

“Stakeholders mandating businesses to integrate environmental concerns with their management strategy is a possible reason behind the slow but steady fall in India's CO₂ emissions”.

Hence H0 and H1 are as follows:

H0: Stakeholders mandating businesses to integrate environmental concerns with their management strategy is not a possible reason behind the slow but steady fall in India's CO₂ emissions

H1: Stakeholders mandating businesses to integrate environmental concerns with their management

strategy is a possible reason behind the slow but steady fall in India's CO₂ emissions

Based on the primary data collected from the respondents, vide Tables: 1 and 2, a chi-square test was applied to ascertain the association, if any, between the variables. The following Table reveals the computation made using MS-Excel.

	Category	Observed Values		
		Yes	No	Total
	Corporate executives	32	18	50
	Investors	42	8	50
	Total	74	26	100
	Category	Expected Values		
		Yes	No	Total
	Corporate executives	37	13	50
	Investors	37	13	50
	Total	74	26	100
		Yes	No	
	o-e	-5.0000	5.0000	
2		5.0000	-5.0000	
	(o-e) ²	25.0000	25.0000	
		25.0000	25.0000	
	((o-e) ²)/e	0.6757	1.9231	
		0.6757	1.9231	
	CV	1.3514	3.8462	5.1975
	TV			3.8415
	p			0.0226

The calculated value of χ^2 is 5.1975, higher than the table value of 3.8415 for an alpha of 0.05 at one degree of freedom. Hence the null hypothesis is rejected, and the research hypothesis is not rejected. $p=0.0226$ is the inverse of the one-tailed probability of the chi-squared distribution.

1.13 Recommendations

The following are the researcher's recommendations in the light of the findings arrive at:

1. The Covid-19-driven nationwide lockdown stalled the wheels of the country's economy. When the wheels of production come to a

grinding halt, there can be no emission, carbon or otherwise. However, with Covid-19 having been overcome by and large, some sectors are to their pre-Covid-19 levels and many more are rapidly on the way. Consensus has it that it is only a matter of time before every sector regained its pre-Covid-19 level of activity / operations. In the circumstances, one should not detract fully from the country's achievement in the carbon emission space.

2. It is true that coal consumption has been falling too, although the country hopes to leverage the coal sector in its drive to become a USD five trillion economy. However, one should not miss

the wood for the trees. Even before the lockdown was enforced, the demand for coal had thinned in the country. Further, growth in the generation of energy from renewable sources had picked up steam.

3. Stakeholders in businesses have been lately asserting themselves in the environment sustainability space. Lately, the super cyclone that hit the country's coast, leading to floods and the climate disaster the country has been witnessing almost at regular intervals in general, have led the stakeholders to mandate businesses to integrate environmental concerns with their management strategy. This will go a long way in reducing the country's carbon emissions.
4. India is required to achieve the climate mitigation goal of reduction in greenhouse gas (GHG) emission intensity by 33-35 percent by 2030 compared to 2005 levels. CO₂ emissions emanating from energy generation account for more than 75 percent of all GHG emissions in the country. But India's emissions are bound to rise in the years to come since economic growth raises demand for energy.
5. Under the Paris Agreement on Climate Change, India has committed itself to ensure that 40 percent of its electricity generation capacity is accounted for by non-fossil fuel sources by 2030. Further, it will also reduce its "emissions intensity", a ratio of total emissions to gross domestic product, by at least 33 percent relative to 2005 levels. India has raised its solar-energy capacity 12x since 2014 and has put in place initiatives to conserve electricity. These measures should help the country to honour its two commitments under the Paris Agreement.

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