Chola MS
RISK SERVICES

COVID-19 lockdown has improved the "AIR WE BREATHE."

Can we CAPITALIZE on the unexpected side-benefit during post-lockdown?

COVID-19 has forced many countries, including India, to follow stringent nationwide lockdown. The Indian government also imposed lockdown on the population of more than 1.3 billion citizens since 25 March 2020 to control the spread of the COVID-19 outbreak.

As industries have remained shut, commercial activities are inactive and vehicles are off the road across the country, the quality of air has improved exceptionally well in most of the cities in India. Similar to many developed and developing countries, India has also witnessed dramatic improvements in its air quality over the last couple of months since the lockdown.

Apart from containing the pandemic spread of the coronavirus, the benefit of COVID-19 lockdown on the environment and health is by improving the air quality, especially at the ground level. However, this unexpected benefit should not be seen as a silver lining or may not be permanent as it is linked inextricably with the country's economic activity and financial growth. Thus, we can expect the Air Quality Indices rise to the same level post lockdown once the industries resume its operations and the economic activities in the country recommence.

As the lockdown in the nation gets relaxed and the economic activity is gearing up back to the normal, the question is, how best can we capitalize on the situation? What can be done by the government, the individual industries, and other significant contributors to air pollution? Shutting down all industries and banning cars is not a sustainable solution to combat climate change. Maybe it is the opportunity for all to rethink and upgrade the environmental policies to sustain the Air Quality Index that we have witnessed during the lockdown.

In this document, we also identified various air quality measures based on the insights from study literature on national-level policymaking, technological improvements, and stakeholder involvement.

Unexpected Benefits of COVID-19 Lockdown on Air Quality

Lockdown conditions favorable for the reduction in ground-level Air Pollution

Ambient Air quality trend based on Central Pollution Control Board published data

Associated health benefits due to reduced air pollution as per World Health Organisation

Potential Measures to Retain the Benefits of Air Quality Improvement

Recommended upgrades in the national level policy framework to reduce ground-level air pollution

Industry/business level responsible and sustainable improvements

Responsibility of community and involvement in achieving a cleaner environment

Unexpected Benefits of COVID-19 Lockdown on Air Quality

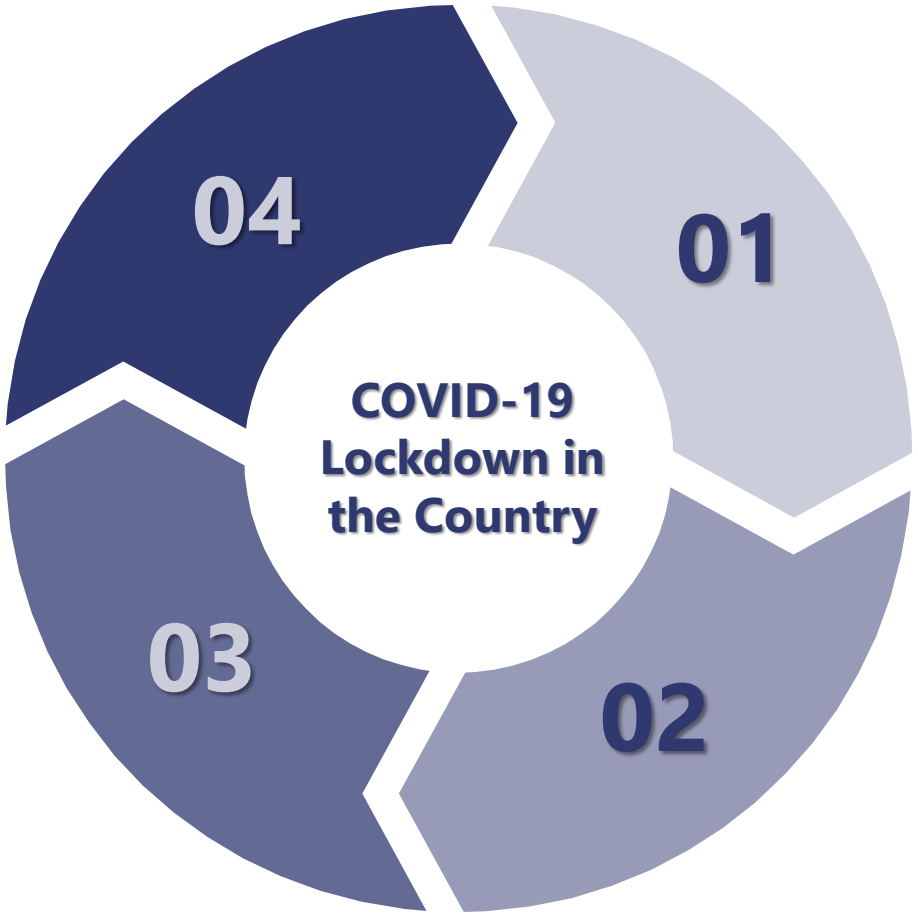
Lockdown conditions favorable for the reduction in ground-level Air Pollution

Fugitive and other Miscellaneous Emissions

Anthropogenic non-point, non-regulated and fugitive emissions due to various public activities such as fossil fuel burning, open waste burning, operating diesel generators, brick kiln operations, etc. were also minimized considerably during the lockdown period which also contributed to the improved air quality

Reduced Electricity Consumption

Though electricity is one of the basic societal needs, consumption was reduced considerably due to lower demand as the industries and commercial activities were inactive. Hence the equivalent power generation from coal based thermal power plants was reduced and thereby reduction in combustion emissions was observed during the lockdown.



Industrial Emissions

Except the essential products manufacturing industries such as pharmaceuticals and food processing, most of the industrial sectors remained shut during the lockdown period. Hence, there was a considerable reduction in industrial process emissions and fossil fuel combustion emissions such as captive power plants.

Vehicular Emissions

During the lockdown period, there is a significant benefit with lower or negligible vehicular emissions and their nuisance. This was observed in all the metropolitan cities, and most of the urbanized areas in India. Petrol and Diesel has witnessed huge demand erosion due to lockdown restrictions.

Unexpected Benefits of COVID-19 Lockdown on Air Quality

Ambient Air quality trend based on published data

01 As most of the industries remained shut and vehicles were off the roads, the AAQ (Ambient Air Quality) data reported and published by CPCB (Central Pollution Control Board) showed that there was a significant decline in various pollutant levels, including PM_{10}, $PM_{2.5}$, SO_2, and NO_2 during the lockdown period, as compared to last year during the same period. The inferences were elaborated in detail in following slides.

02 Other factors, including weather conditions, may also contribute to the reductions seen in pollutant concentrations. However, there was a significant achievement in overall compliance with National Ambient Air Quality standards prescribed by CPCB for ambient air quality

03 The analysis of AAQ data reveals that the clusters where ongoing coal-based power plants and other essential industries were located still exhibited some pollution levels, especially for SO_2 and NO_2.

04 There is a significant improvement in air quality, especially in urban areas, from alarming levels to satisfactory levels, which is evident from the data reported and published by the CPCB

PM_{10} **$PM_{2.5}$** **SO_2** **NO_2**

Unexpected Benefits of COVID-19 Lockdown on Air Quality

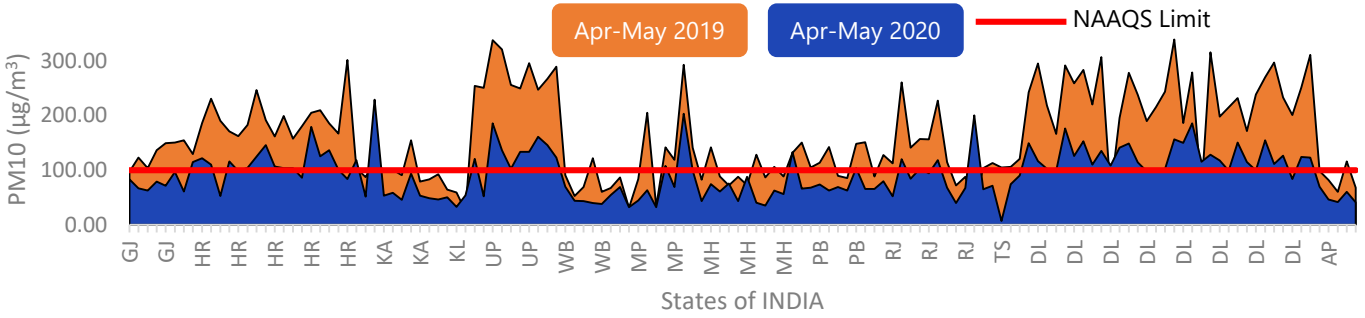
PM_{10} (Particulate Matter – less than 10 microns size)

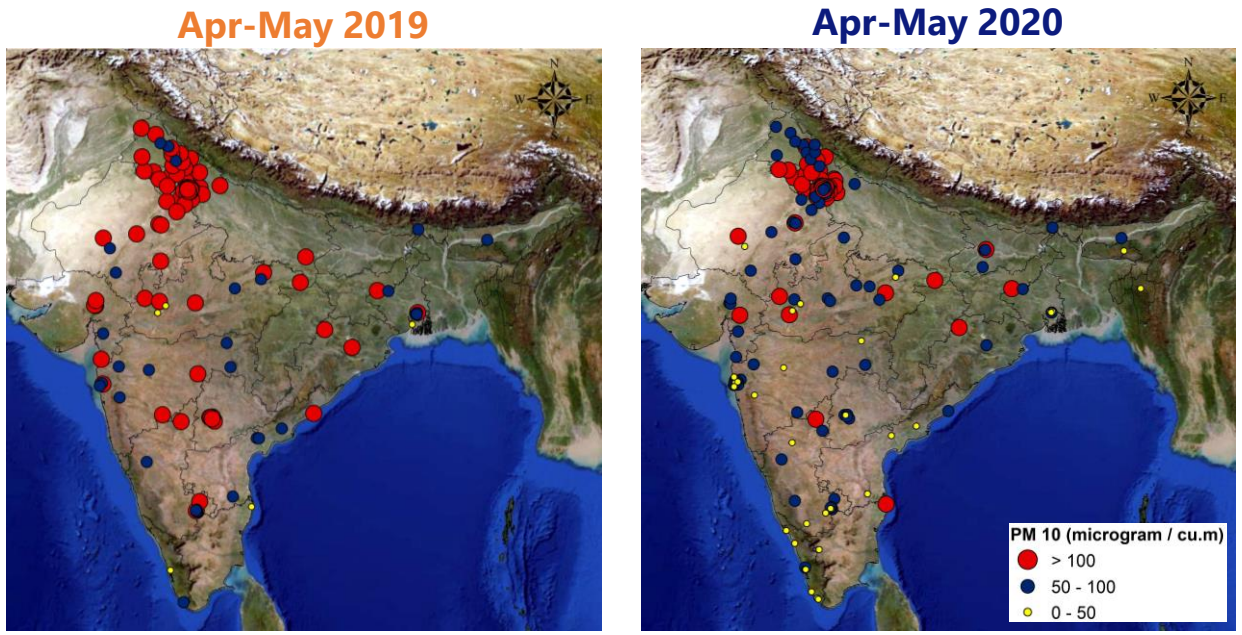
The real time continuous ambient air quality data reported and published by CPCB across the country shows a significant improvement in overall air quality in terms of PM_{10}.

The country saw a dramatic drop in PM_{10} by approx. 40% – coinciding with the strict lockdown measures implemented as compared to last year during the same period.

Air quality data at 140 monitoring stations across the country shows the data at 60% of the stations comply with the NAAQ standard as compared to 30% recorded last year during the same period.

In the metropolitan and other cities, the air quality has improved by 50% to 70% which is phenomenal considering the fact that India is one of the most polluted countries.





(a) (b)

CPCB published average PM_{10} concentrations across India from (a) Apr to May 2019 and (b) Apr to May 2020 (During Lockdown period due to COVID-19)

Unexpected Benefits of COVID-19 Lockdown on Air Quality

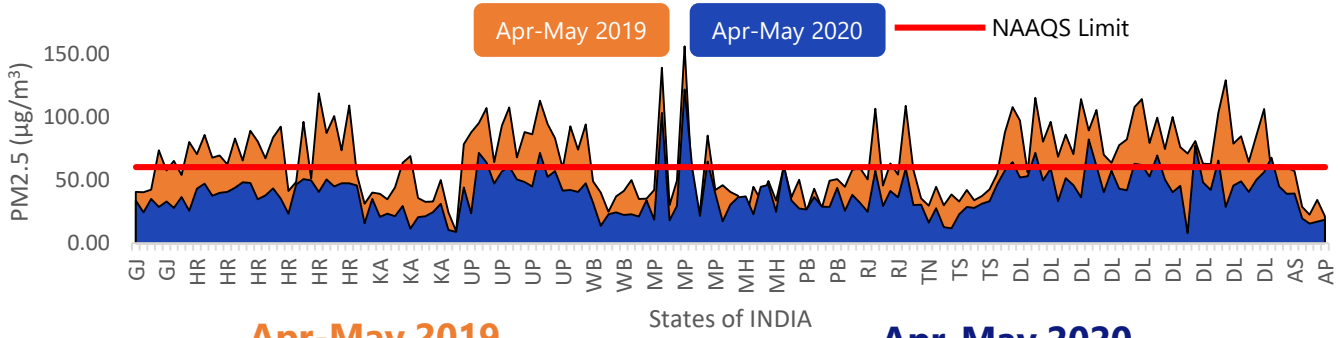
$PM_{2.5}$ (Particulate Matter – less than 2.5 microns size)

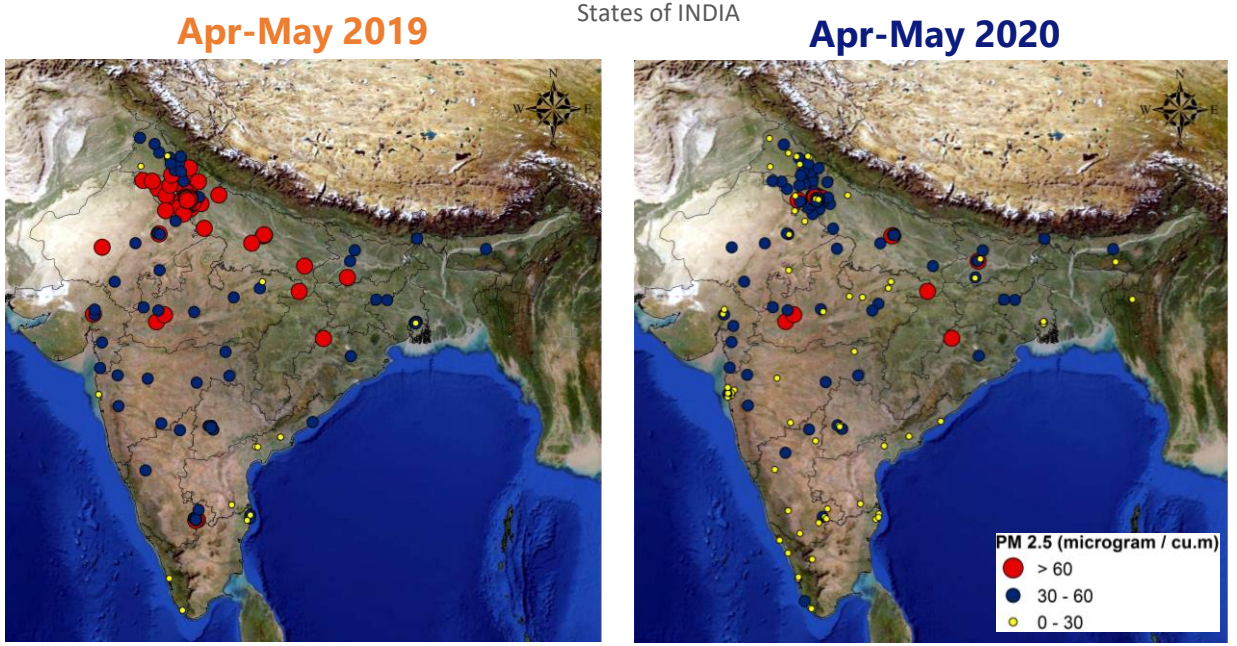
$PM_{2.5}$ is a crucial ambient air quality parameter for the human health aspect as it can penetrate the lungs, enter the bloodstream and then to the heart through respiration.

Similar to the trend of PM_{10} concentration, $PM_{2.5}$ also showed a significant drop by approx. 40% in the overall levels in the country as compared to last year during the same period. Such a reduction is due to the country's limited industrial processes, construction, and demolition activities

80 % increase in compliance status across the country as per the NAAQ standard as compared to last year during the same period.

Metropolitan and other cities witnessed huge reduction in $PM_{2.5}$ and its associated secondary pollutants due to complete minimisation in transport emissions (both exhaust fumes and tyre and brake wear)





(a) (b)

CPCB published average $PM_{2.5}$ concentrations across India from (a) Apr to May 2019 and (b) Apr to May 2020 (During Lockdown period due to COVID-19)

Unexpected Benefits of COVID-19 Lockdown on Air Quality

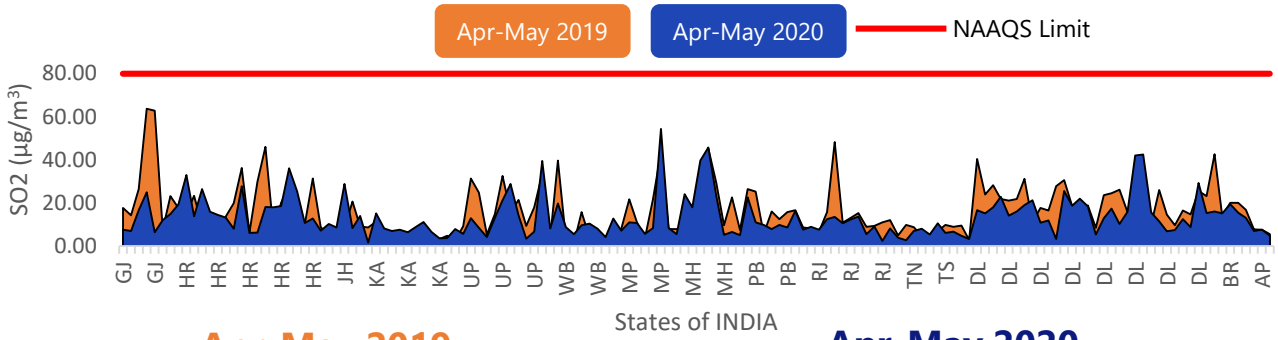
Sulphur Dioxide – SO_2

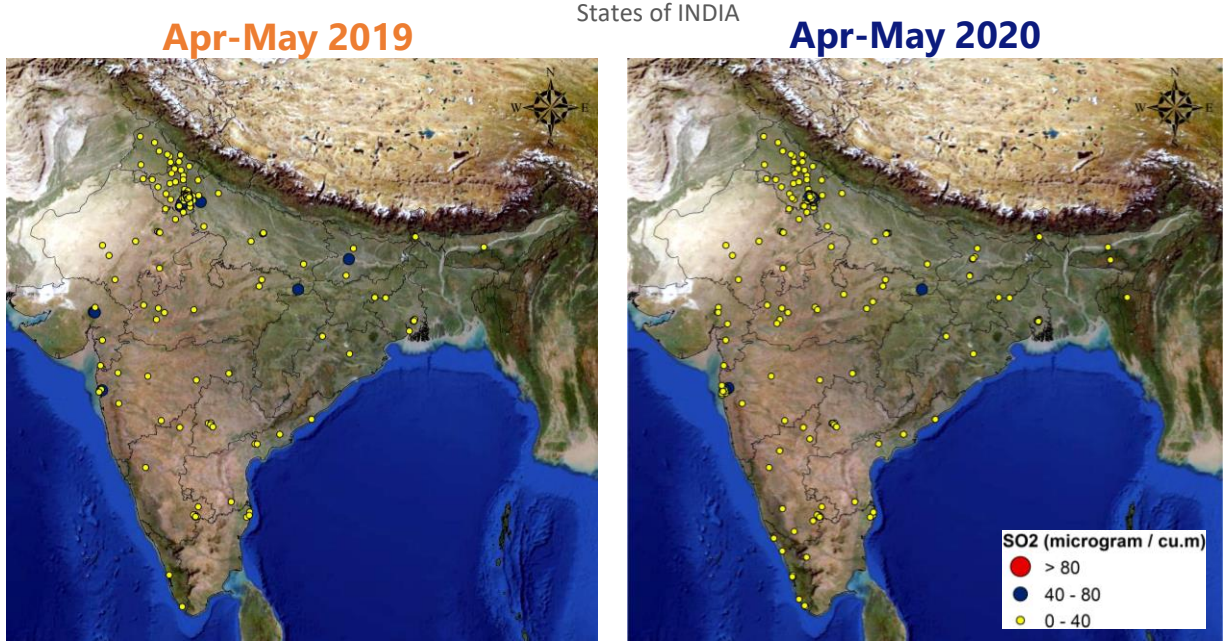
SO_2 concentrations remain much below the acceptable limit which could be due to switch in the usage of fuel containing high sulphur content (such as coal) to cleaner fuels (such as NG) for industrial, commercial, and household heating purposes.

SO_2 reduction has counted low compared to the other pollutants, and the trend was also not evidencing a noticeable definite change. However, there is a slight decrease of about 15% compared to the last year during the same period.

Coal-based thermal power plants were operated even with a reduction in overall electricity consumption by about 10% during the lockdown period.

For a few years, SO2 is the only pollutant that was consistently complying with the NAAQ standard. The primary source of SO2 is diesel and coal combustion. Now, most metropolitan cities have access to BS-IV fuel, and usage of coal for cooking has significantly reduced.





(a) (b)

CPCB published average SO_2 concentrations across India from (a) Apr to May 2019 and (b) Apr to May 2020 (During Lockdown period due to COVID-19)

Unexpected Benefits of COVID-19 Lockdown on Air Quality

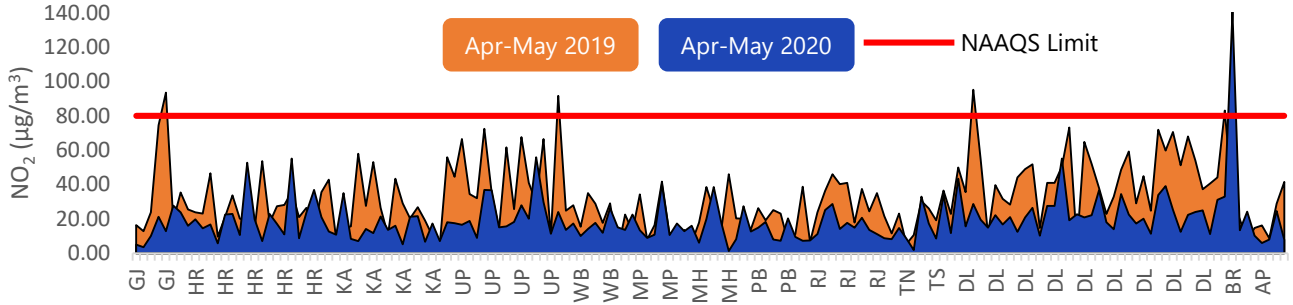
Nitrogen Dioxide – NO_2

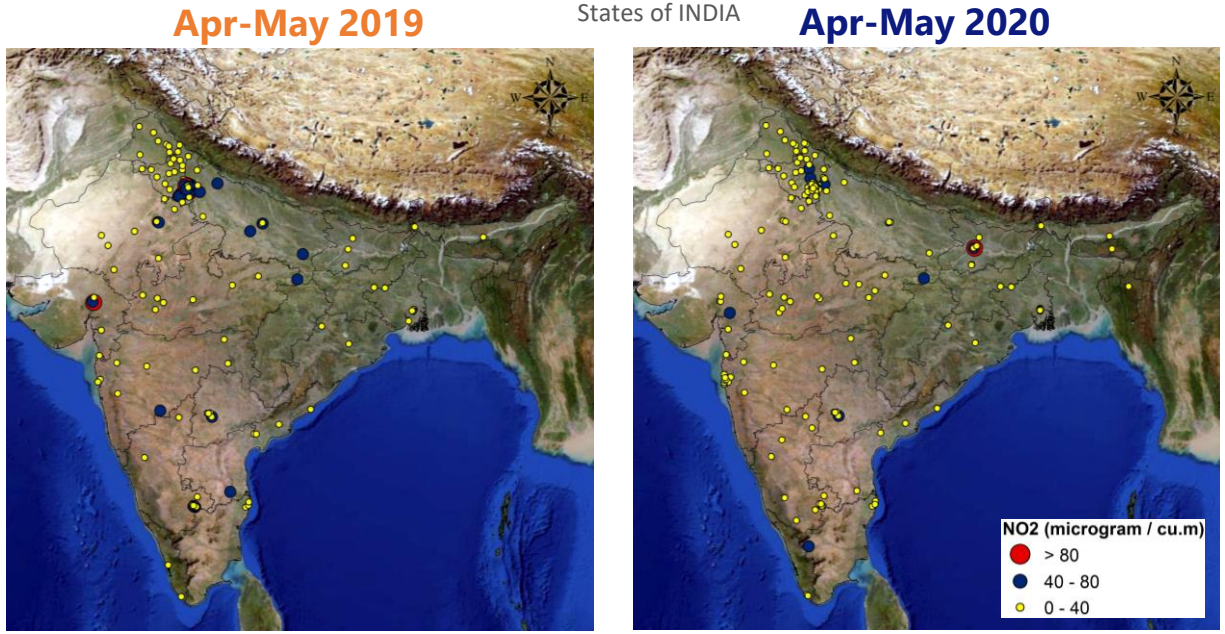
NO_2, a pollutant mainly emitted by road transport and combustion is one of the harmful gases which increases the likelihood of human respiratory problems.

NO_2 also showed a significant drop by approx. 12% in the overall concentrations in the country as compared to last year during the same period.

The measured values are complying 100 % of compliance status across the country as per the NAAQ standard as compared to last year during the same period.

Metropolitan and other cities witnessed a considerable reduction in NO_2 by about 45% as compared to last year during the same period due to negligible vehicular emissions.





(a) (b)

CPCB published average NO_2 concentrations across India from (a) Apr to May 2019 and (b) Apr to May 2020 (During Lockdown period due to COVID-19)

Unexpected Benefits of COVID-19 Lockdown on Air Quality

Associated Health benefits due to reduced air pollution

01 NO_2, SO_2, $PM_{2.5}$, and PM_{10} are among some of the significant pollutants which, when exposed to for an extended period, can cause respiratory disorders. There is mounting evidence of detrimental health impacts of air pollution, through lung disease, heart attacks, asthma, effects on pregnancies and intelligence levels.

02 Air pollution is one of the crucial environmental health problems that affect people in developed and developing countries. According to the World Health Organization (WHO), 7 million people die every year due to air pollution. Greenpeace claims that more than 1.2 million premature deaths were recorded in 2017 due to air pollution

03 NO_2 increases the symptoms of bronchitis in asthmatic children with long-term exposure. Whereas, SO_2 can affect the respiratory system and the functions of the lungs and irritates the eyes. SO_2 in the air combines with water and forms sulfuric acid, which is the main component of acid rain.

04 The low levels of air pollution attained during the lockdown period can reduce the annual death toll in India by many folds if the air quality conditions persist after the lockdown. Besides, various studies show that air pollution (Particulate Matter as dust or aerosols in particular) aids the deadly coronavirus and acts as a carrier for spreading the virus.

Potential Measures to Retain the Benefits of Air Quality Improvement

Recommended upgrades in the national level policy framework to reduce ground level air pollution

Policy strategies must aim at the effective reduction in primary pollutants such as PM_{10}, $PM_{2.5}$, SO_2, and NO_2 in ambient air, leading to a decrease in health risk and a safe environment.

Besides to the initiatives government has already implemented or in the process of implementing, here are some of the general recommended and disruptive upgrades based on the best practices adopted in various countries for constituting or upgrading the national level policy framework focusing on retaining the clean ambient air attained during the lockdown period or on eradicating air pollution.

1 Measures to cut emissions

Reducing the toxic emissions with limited stress on the countries economic growth can be achieved by accelerating the transition to clean energy. Dependency on bio-derived fuels and other renewable power sources for industrial and commercial activities will significantly reduce the burden on the air environment.

Giving carbon credits and subsidies by the regulatory agencies to the organizations embracing such initiatives to cut down GHG emissions is one way of encouraging.

2 Measures towards behavioural change - private vehicles

Many cities in the developed countries have already announced measures to improve walking and cycling and support a low-carbon, sustainable recovery from the coronavirus crisis. A car-free (or limit car use) initiative will be ambitious not only for cleaner air but also for safer streets.

The country must embed such strategies in a phased approach to bring in the behavioural change in public towards such low-carbon initiatives. It is also recommended to impose stringent changes to deter the most polluting vehicles.

3 Measures to improve public transport & Infrastructure

"A Bus or a Metro rail can replace a considerable number of passenger cars in terms of emissions."

It is necessary to Increase the standards of public transport system by improving the frequency and reliability with potential subsidies. It is key for the successful outcome of achieving its efficacy for the public.

Developing the integrated transport hubs (Ex: Hub linking bus, train, and cycling facilities) can be considered an effective and efficient urban area (re)planning parameter to curb the road traffic and associated vehicular emissions.

Potential Measures to Retain the Benefits of Air Quality Improvement

Industry/business level responsible and sustainable improvements

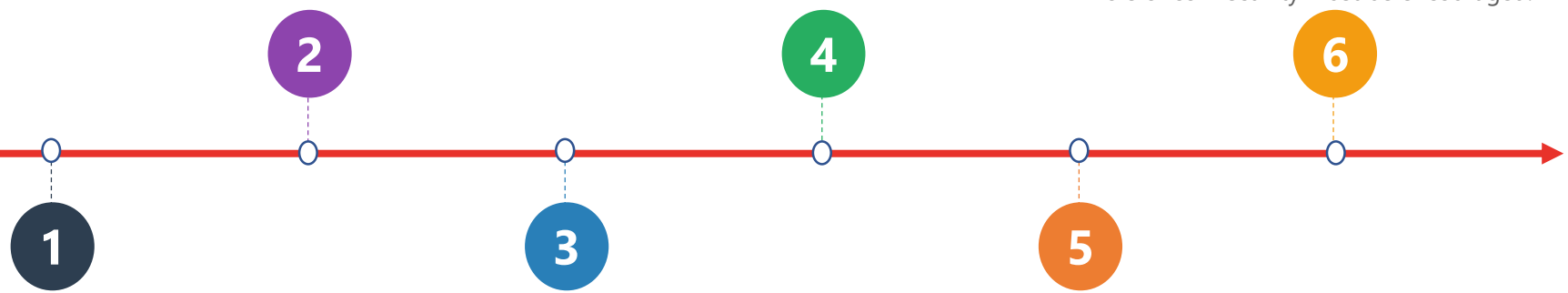
"Many Industry leaders and environmental protagonists are saying that climate change is the biggest risk we face, which is beyond the current pandemic."

Over the years, the country has recognized for the industrial activities concerning the products manufactured, quantities produced, and its scale & diversity.

40% of the gross industrial value added to the Indian economy is through MSME (Micro, Small & Medium Enterprises) as per the ministry of MSME. Thus it is nearly appropriate to mention that industrial emissions are distributed proportionately between the large and small scale industries.

The recommended best practices suggested primarily focusing but not limited to only the large industrial groups. Most of the recommendations do not just emphasize on the improvement in ambient air quality but also the overall performance in terms of environmental and social issues.

The industry as a whole is growing increasingly interdependent in meeting business goals and export demands. It is important to consider sustainable development and eco-friendly approach to comfort the businesses irrespective of the scale of the industry.



1 Climate Change

Climate risk should be a key priority for businesses. An increase in GHG emissions is one of the primary concerns of climate change on a global scale

2 Environmental, Social, and Governance (ESG)

ESG credentials should be a new reality and must be higher on the agenda. ESG performance will be vital in building trust for the businesses

3 Sustainable Development Goals (SDG)

Industrial objectives must align with sustainable development goals (global goals), especially for combating climate risk

4 Social Accountability and CSR

Real focus by the businesses on the wellbeing of their employees and the communities they operate within through CSR

5 Transition to clean energy

The usage of biodiesel blended fuels will result in reduced GHG emissions and air pollution and a targeted approach towards dependency on renewable energy
Employers must be encouraged towards cycling, car-pooling, and public transport through subsidies or pre-tax deductions of transport costs

6 Travel less & Digitization

Video conferencing can reduce corporate travel in many cases.
Continuation of homeworking in those roles where it is possible will reduce the overall scope III GHG emissions.
Greater emphasis on digitization and the role of connectivity must be encouraged.

Potential Measures to Retain the Benefits of Air Quality Improvement

Responsibility of community and involvement in achieving a cleaner environment

"Various studies and surveys conducted by the news media across Europe shows greater majority of the public doesn't want to go back to the same situation in terms of air quality."

	Plantation/ Afforestation	Stubble or Open Burning	Public Transport	Private vehicle – Behavioural change	Renewable Energy
Government/ Local Administration	• *Community engagement* • *Fund allocation for plantation and maintenance*	• *Credit and subsidies for alternative practices of stubble or open burning*	• *Improving the Standards and Infrastructure* • *Stakeholder and public involvement in the planning and development stage*	• *Stringent legislation for developing car-free initiatives* • *Infrastructure development* • *Credit for switching to less polluting vehicles (Electric)*	• *Developing the Standards and Infrastructure* • *Air quality strategy to create community ownership of air quality issues*
Civil society organisations	• *Awareness campaigns and mass plantation programs*	• *Research and Development for alternative solutions*	• *Awareness campaigns and encouragement programs*	• *Car-free initiatives development along with the regulatory bodies*	• *Technology support for the development along with the regulatory bodies* • *Fundraising programs*
Urban community	• *Plantation along the roads and highways, green roofs, etc.* • *Maintenance*	• *Open dumping and burning to be avoided* • *Local governance for effective monitoring*	• *Fostering the dependence on public transport consistently*	• *Enhancing walking and cycling and Car-pooling* • *Minimizing unnecessary travel* • *Switch to electric vehicles*	• *Fostering the dependence on various renewable power sources*
Rural community	• *Community plantation*	• *Open dumping and burning to be avoided* • *Local governance for effective monitoring*	• *Continuing the dependence on public transport*	• *Switch to electric vehicles*	• *Fostering the dependence on various renewable power sources*
Industrial society	• *Awareness campaigns and encouragement programs* • *Mass plantation* • *Maintenance*	• *Open dumping and burning of industrial wastes to be avoided*	• *Infrastructure development under CSR* • *Awareness campaigns and encouragement programs*	• *Encouraging travel less/ limited travel initiatives,* • *Switch to electric vehicles* • *Self-governance on car-free initiatives*	• *Infrastructure development under CSR* • *Supporting in government initiatives through PPP*

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