

## Proposal of “carbon-lockdown” policy in the light of environmental silver lining of COVID19 lockdowns

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### Abstract:

The world has been going through an unprecedented surreal phase since the beginning of 2000 due to the outbreak of Covid-19. Due to the deadly effects of this disease hundreds of thousands of people across the world have died and several million people are infected. To restrict the spread of this disease countries across the world declared complete or partial lockdown. Due to the lock down, suspension of public transportations, closure of business houses and other institutions the world economy has experienced a severe blow. Economics of all the major developed and developing countries are in shambles. Due to these depressing scenarios people across the world are also suffering from mental issues. Several socio-economic issues have also been surfaced in developed and developing countries. Amid all these gloomy surroundings the only positive outcome is healing of nature. The quality of all the elements of nature have been improved worldwide drastically. In this paper we are going to discuss how the lockdown or reduction of economic activities have improved the air quality and how the regulatory bodies can take cues to develop a long-lasting carbon policy. Here we have introduced a seminal concept of “Carbon lockdown” policy and proposed some other practices, which can reduce emissions considerably.

**Keywords:** COVID-19, Greenhouse gases, Carbon polices, Carbon-lockdown, Environment

### Introduction:

Officially, the outbreak of coronavirus was first recorded in Wuhan, China in the month of December of 2019. On February 11, 2020 World Health Organization (WHO) termed it as COVID-19. In March 2020 WHO announced that the outbreak of recent coronavirus is a pandemic (New Scientist, 2020). Millions of people have fallen prey of this virus. This virus spreads with a deadly pace through person to person contact and respiratory droplets from infected persons. According to many scientists getting vaccine is the only solution of this pandemic (Callaway, 2020). To avoid rapid spread of this disease several governments across the world have announced large-scale quarantines, travel restrictions, complete or partial lockdowns, but that leads to a disastrous economic crisis. As per the United

Nations this pandemic disrupted global supply chains and international trade. Since, many countries closed their borders during this phase the movements of people and tourism flows came to a halt. Global economy shrank by 4.3 % in the year of 2020 due to outbreak of this pandemic (United Nations, 2021). In many countries the issues related to alleged ethnical discrimination or perils of migrant labors have worsen the scenario. The geo-political environment has hit the nadir. People across the globe have been suffering from acute stress and psychological distress. In the middle of all the miseries and sufferings the only silver lining is recovering of environment. The quality of water, air has

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got improved dramatically. Globally the emissions level of CO<sub>2</sub> and other greenhouse gases drastically reduced and the wildlife now reclaiming old habitats. Clearly the lockdown, reduced rate of transportation, less consumptions of fossil fuels have given nature to regain, but obviously it's not a solution. Lockdown has the devastating effects on lives and livelihoods globally. Unprecedented quarantines, restrictions on traveling, and social distancing have driven a sharp fall the in business and escalated recession in many countries. Lay off of workers, and unemployment levels has risen sharply (Mckinsey & Company, 2020). So, many countries have lifted or going to lift lockdowns completely and partially. Now, as the countries are going to restore economic normalcy, the emissions of GHGs are increasing again. Levels of some air pollutants GHGs rose back in China (Deccan Chronicle, 2020). To reap a long term and sustainable environmental benefit regulatory bodies should formulate some long-term strategies.

For last couple of decades regulatory bodies and governments have formulated and imposed different carbon policies, but each of the policies have some shortcomings. In the year of 2015 countries engaged in the United Nations Climate Change Conference and chalked out the Paris Agreement (Ghosh et al, 2020). The central theme of this agreement was to diminish the harsh threat of changing climate. The central idea is to keep the global temperature rise of this century below 2°C above pre-industrial levels and putting further efforts to limit the same to 1.5°C (United Nations Climate Change, 2020). The studies are showing that the world is off the mark. Most of the countries are failing to meet their targets (Leahy, 2019). Since, the current policies are failing to deliver the objectives, researchers should adopt new policies. In this paper we are going to propose a new policy taking cue

from the recent lockdown. This paper is presented as following- in Section 2 we have discussed effects of GHGs emissions on environment, lives and livelihood. Section 3 discuss about different existing carbon policies. In Section 4 chronological facts are given to show the effects of lockdowns on emissions GHGs. New policies and practices are discussed in section number 5 and then Section 6 concludes.

### **Effects of GHGs emissions on environment, lives and livelihood:**

An adequate quantity of greenhouse gases is essential for the existence of our planet. Without them the earth temperature would be very low or too cold. However, to achieve economic growth and development the human race increases too much of these gases in the atmosphere. The concentrations of these gases cause global warming and acute climate change. The climate change is continuously affecting surface air, ocean temperatures, sea levels, human health, melting glaciers, water resources, forest and wildlife. As per the 5<sup>th</sup> assessment report of IPCC the average sea level jumped up by nineteen centimeters during 1901-2010. The report further warned that if current pace of rise continue it will cause 15 centimeters to 90 centimeters higher than present sea level and will threat the lives and livelihoods of 92 million people (Iberdrola, 2020). Due to rise of GHG's emissions the glaciers around the world have been retreating unprecedented rates. The massive industrialization upsurge the rate of glacial retreat and scientist projected that at the end of this century many ice-caps and ice-shelves will be disappeared (NSIDC, 2020). The changed climate directly affects the crop planting dates to shift and further cause drought and floods (EPA, 2017). The different GHG's have different effect on crops. Branscombe (2016) found in a study that around 93 per cent crop losses in this

century due to non-carbon dioxide emissions (i.e. CH<sub>4</sub>).

Apart from environmental effect of emissions, it also poses threat to human health. The rising emissions level affect the physical, social, and psychological health of humans (NIEHS, 2019). Pure air is healthy for human life, breathing in dirty air caused premature mortality. Air pollution yearly slays around 7 million people, and nine out of the ten people breaths in air that contains high levels of pollutants (WHO, 2020). There is intense relationship between air pollution and spread of viruses, the polluted air particles acting as vehicles for virus transmission (Gerretsen, 2020). In a study Kan et al. (2005) studied the correlation among air pollution and mortality rate of SARS in Beijing, they revealed that upsurges of air pollution hike the chances of dying from the SARS. Tang et al. (2018) studied the impact of air quality on respiratory infection in Shaanxi province of China. They found that there is significant correlation between number of cases of influenza-like illness (ILI) and air quality index (AQI). They also observed that ILI cases progressively increased with the increase in bad quality of AQI. The present upsurge cases of Covid-19, urges the research scientist to study the association between emissions and mortality rate. In this context, Wu et al. (24 April, 2020) looked into three thousand counties in the USA up to 22 April, 2020 and conclude that a mere increase of 1 µg/m<sup>3</sup> in PM 2.5 may lead to an eight per cent increase in the COVID-19 death rate. A study on air quality in Italy also found relationship air pollution and mortality rate of covid-19 (Conticini et al., May, 2020).

These emissions directly affect economic growth of a nation. The diseases like higher rates of chronic respiratory diseases, diabetes, etc. reduce the ability to work and stanchly lower the labor participation rate. Thus, air pollution has also economic cost

for the society. According to OECD (2016) healthcare related costs due to air pollution is estimated to increase from \$21 billion in 2015 to \$176 billion in 2060 globally. The Centre for Research on Energy and Clean Air (CREA, 2018) assessed that air pollution caused \$2.9 trillion economic cost. Greenpeace Southeast Asia and CREA jointly estimated country wise burden of air pollution. In 2018, the total cost of air pollution of China, USA and India was \$900 billion, \$600 billion and \$150 billion respectively. In terms of per cent of GDP, China's cost of dirty air equated to 6.6 per cent, USA 3 per cent and India 5.4 per cent of their respective domestic GDP (World Economic Forum, 2020). Among all GHGs CO<sub>2</sub> is most prevalent as it contributes 60 per cent of enhanced greenhouse effect (BBC, 2014). The reduction of CO<sub>2</sub> and other GHGs emissions is a worldwide goal and has gained momentum. In the next section we are going to discuss the evolution, mechanism, pros and cons of different carbon policies.

#### **Brief discussion about existing carbon policies:**

Initially, the environmental related activities and movements gained pace in The United Nations of America in 1950s and 1960s (Ghosh et al., 2020). Later, different governments of various countries implemented different carbon policies (Ghosh et al., 2017). All these policies can be categorized under three basic categories- I. Carbon tax/price policy, II. Carbon cap-and-trade policy, and III. Strict carbon cap policy (Ghosh et al., 2016). The mechanisms of these policies are as following.

**Carbon tax policy:** In case of Carbon tax policy regulatory bodies charge tax on every unit of emissions (Kushwaha et al., 2020). According to Labatt and White (2007) the basic idea of Carbon tax policy is to set a price on each unit of emissions of carbon to

raise a fund for creating new opportunities for development on green technology. In the existing literature most of the authors presume a cost which firms incur to diminish emissions and refer that as the cost of carbon. This cost can be assumed as a simpler form of carbon tax (Ghosh et al., 2020). The rate of tax on emissions varied widely from one country to another. In comparison to other policies this policy is quite simple and also easy to implement (Ghosh et al., 2018).

**Carbon cap-and-trade policy:** Under this policy organizations are allowed to emit within a given threshold level, which is known as cap. If an organization needs more to emit, then that organization may buy carbon credits from other organizations. If that organization emits lower below the specified level, it earns carbon credit that can be sold to other firms (Ghosh et al., 2016).

**Strict carbon cap policy:** In case of strict carbon cap policy, regulatory bodies allow organizations to emit CO<sub>2</sub> to a threshold limit, this threshold limit is known as the cap. In this policy the penalty for crossing the limit is infinitely large (Chen et al., 2013). So, organizations are bound to manage their carbon emissions within the threshold level. This policy is considered as most stringent as far as carbon policies are concerned.

The Kyoto Protocol, adopted in 1997 drove the implementation of carbon policies to a large extent. Hepburn (2007) portrayed the evolution the concept of carbon trading. Cael (2011) discussed that how this protocol facilitated to set up an international market for trading of GHGs. The widely known European Union-Emissions Trading Scheme was first floated in 2005. It is the largest policy for the trading of GHGs allowances (Segura et al., 2014). It is practiced in the countries which

are part of European Union. Many other carbon trading schemes have also been implemented in many parts of the world. The idea of carbon taxation has also gained momentum in several countries. This idea was first conceptualized in the United Kingdom in the report of royal commission on pollution way back in 1972 (Dresner et al., 2006) but, Carbon tax policy was first got implemented in Finland 1990. Since 2013 The UK has been following this policy. Australia adopted Carbon tax policy in 2012, but latter they revoked it (Robson, 2014). The concept of Strict cap policy is also gaining popularity in different countries. Some environmentalists believe that it is the most effective scheme as far as curbing emissions is concerned. As per Border (2013) Mr. Barak Obama gave thought to implement this scheme in power plant sector during his presidency. The concept of this policy also gained popularity among the masses. Yale University conducted a poll and that revealed that 64 per cent of people were in favor of imposing this policy (Lopez, 2014). Due to stringent nature of the Strict carbon cap policy, it has not been implemented in its exact form anywhere.

All the carbon policies, practiced in different parts of the world are basically based on Carbon tax/cost policy or Carbon cap-and-trade policy. Both the policies have some shortcomings. In case of Carbon tax policy researchers have found that it may leads to shrinkage of economic growth, slowdown social welfare, and can lead to carbon leakage (Lin and Li, 2011). Gurtu et al. (2016) have shown that this policy can adversely affect a nation's economy if it is applied without any incentive. Designing a proper carbon tax is also significantly challenging (Marron and Toder, 2014). In case of Carbon cap-and-trade system, Wittneben (2009) argued that it might not be the most cost-efficient policy. Weak caps, volatility in prices, lose allocations of allowances are some of the weak features of

existing cap-and-trade policies (World Resources Institutes, 2016). Few environmentalists believe that “Carbon tax” policy is better, but other believes that “Carbon cap-and-trade” policy is more effective, but without joining the debate one can conclude that both fell short to deliver as far as emissions controlled is concerned. In Paris agreement 184 countries made carbon emission reduction pledges for 2030, but most of countries are failing to deliver (Leahy, 2019). According to some reports no country will full fill their emission targets, taken in the Paris Agreement (Gibson, 2019).

During the recent lockdown due to spread of COVID-19, the environment has experienced recovery, almost beyond our expectations. The positive effects of lockdown on environment, especially on air are discussed in the following section. Based on the cues from nature we have further proposed a “carbon lockdown” policy in this paper.

#### **Effects of lockdowns on emissions GHGs:**

To prevent the wide spread of Covid-19 around 90 countries called for lockdown and the estimated population of these countries is 3.9 billion. The total population of world is 7.58 billion; it means more than half of the people of the world had been ordered to stay at home by their governments (Euronews, 2020). The covid-19 not only spread crisis in the world but also brought some environmental miracle. Worldwide we observed change in air quality, water quality, wildlife, ozone layer, greenhouse gases and deforestation. The Covid-19 lockdown trigger fall in GHGs emission due to decline in energy demand. There was 43 per cent decline from land transport emission, 19 per cent power generation, 25 per cent from industry and 10 per cent from aviation. Overall a steep reduction in global emissions of carbon by 17 per cent in the month of April, 2020 as compared to April

2019 levels (The Economic Times, 2020). The present section is an attempt to survey the impact of lockdown on air quality. Due to lockdown most of the economic activities remain standstill, which caused a fall in air pollution. Researchers observed drop in nitrogen dioxide (NO<sub>2</sub>), PM<sub>2.5</sub> and CO<sub>2</sub> pollution as a result of public health measures enforced to restrict the spread of Covid-19. Myllyvirta (2020) estimated the reduction in carbon emissions during 4-week lockdown period in china. He found that around 25 per cent reduction in CO<sub>2</sub> emissions that is equivalent to around 200m tonnes of CO<sub>2</sub>. Monks (15 April, 2020), a professor of atmospheric science, utilized the data of Sentinel-5P satellite of European Space Agency and tried to gauge the impact of lockdown on NO<sub>2</sub> pollution. After extensive study he concluded that NO<sub>2</sub> emissions over New York and other major metropolitan areas in north-eastern USA decreases around 30 per cent in the month of March 2020, relative to the same period in 2019. In Indian context, Mahato et al. (2020) estimated the drop in PM<sub>10</sub>, PM<sub>2.5</sub>, NO<sub>2</sub> and CO from 24 March to 03 May lockdown period in New Delhi. The study demonstrated around 60 per cent and 39 per cent reduction in PM<sub>10</sub> and PM<sub>2.5</sub> concentration respectively. The authors reported that NO<sub>2</sub> and CO on an average declined by 52.68 per cent and 30.35 percent, respectively during lockdown phase. Overall, they observed about 40 per cent to 50 per cent improvement in air quality on the 2<sup>nd</sup> and 4<sup>th</sup> day of lockdown. As per the analysis of Air Quality News (04 May 2020) there were about 50 per cent cut in NO<sub>2</sub> emissions major cities in UK during lockdown phase. Edinburgh witnessed the largest decline in NO<sub>2</sub> concentration from a daily average of 74µg/m<sup>3</sup> in the year of 2019 to 28µg/m<sup>3</sup> in the very next year. Bauwens et al. (08 May, 2020) estimated NO<sub>2</sub> reduction in air over USA, Western Europe, China and South Korea. The study

revealed record NO<sub>2</sub> decrease around 40 per cent in overall Chinese cities in January-April 2020 in comparison to the same time period in 2019. They also recorded that the emissions of NO<sub>2</sub> decreased 20 percent to 38 per cent in Western Europe and in the USA during the 2020 lockdown in comparison to the same time in 2019. Whereas South Korea reported an average 33 per cent drop in NO<sub>2</sub> pollution amid lockdown period. The Telegraph (11 May 2020) published a study which claimed that the shutdown of industry and restrictions of vehicles movements has led to huge upliftment in the air quality in Northern India. The study found 44 per cent reduction in AQI between 16 March and 14 April 2020 and suggested that if low concentration of air pollution during the month lasted for one year it could save the lives of 6.5 lakhs people. The New Indian Express claimed (12 May 2020) 49 per cent drop in air pollution in New Delhi of India due to nationwide lockdown enforcement and quarantine measures. Shi and Brasseur (18 May, 2020) further supported the positive impact of lockdown in northern China and found reduction in surface PM 2.5 approximately by 35 percent and NO<sub>2</sub> by approximately 60 percent. Jamie Carpenter (20 May 2020) reported that London's initial lockdown (began in late March 2020) had a clear influence on reduction of NO<sub>2</sub> levels. The figures issued from mayor's office clearly exhibited a 97.5 per cent decline in hourly NO<sub>2</sub> emissions from 2016 to 2019. The Kathmandu Post (25 May, 2020) published a report showing that how Covid-19 lockdowns brought down air pollution in the most 40 polluted cities around the world. It also observed that PM 2.5 concentration level significantly declined in 17 cities in February 2020 as compared with February 2019. Based on these facts and figures we have suggested some policies and practices, if practiced together can bring a lot of improvement in the air quality.

### **New policies and practices:**

In this section we are going to discuss some simple policies and practices which can improve the qualities of the products and services significantly. Each of the steps can be practices individually, or they can be practiced in tandem to bring radical changes.

### **Introduction of "Carbon-lockdown" policies:**

The present pandemic shattered the regional, national and world economic structure. Despite economic destruction, it changes the belief of governments, businesses, environmentalist to deal with environmental issues like NHGs emission, rising global temperature and air pollution. During lockdown period many researchers and environmental research institutes studied the impacts of lockdowns on air quality and most of them have observed that ensuing lockdown have shown improvement in air quality. Thus, the present lockdown can help us to adopt an alternative carbon policy - 'Carbon-lockdown' to curtail the emissions. It has been observed that the environment can "heal" itself without any human interface, if we close polluting activities for some days. Though, the recent lockdown is a short-term opportunity for improvement of air quality, we can use it as a policy to make air quality improvement permanently. Our proposed steps are discussed in the following. At global level governments of each nation should think about carbon-lockdown to control the carbon emissions. The governments may impose the carbon lockdown in two different ways.

Firstly, the government of each nation should turn-off all major carbon emission activities for a period of 15 to 20 days continuously every year. In UK after two weeks of lockdown many cities witnessed 60 per cent fall in NO<sub>2</sub> pollution. Whereas, in china there were 40 per cent drop in NO<sub>2</sub> pollution in late January and early February 2020 as compared to same

period of 2019 (World Economic Forum, 2020). In India in the month of March CO<sub>2</sub> emissions was reduced by 15 percent due to lockdown. The above facts give us insight that a lockdown of 15-20 days can considerably reduce the emissions rate. Many countries/regions observe different socio-religious festivals for 10 to 15 days at a stretch and manufacturing and service industries remain closed during those days. Governments can consciously try utilize those days to heal the environment by further curtailing the non-essential activities. Secondly, the entire lockdown period of 15 to 20 days can be distributed over the year. Every country should halt non-essential activities in once or twice in a month. If possible, all the countries should observe the “lockdown” days simultaneously. Here, as the number of lockdown days are distributed over the years, the number of days should be increased.

This “carbon-lockdown” policy can be considered as the fourth major carbon policy (besides all the major existing carbon policies, discussed earlier). This policy is very simple in mechanism, but if it get implemented it will be very effective. When many other policies failed to deliver, this policy should deliver the desired outcomes. The Governments can utilize the revenues generated from Carbon tax or Cap-and-trade to compensate organizations during “carbon-lockdown” period. Even the governments can a lot fund in their budgets to support business organizations during the “carbon lockdown” periods, considering the huge effects of emissions on lives and livelihoods that will be a win-win proposition for all stake holders.

#### **Introduction of “Carbon Tax” policy on domestic consumptions:**

The “Carbon Tax” policy, as described earlier is one of the basic carbon policies. Many countries have imposed this policy in different industries. In some countries it has

been imposed or going to be imposed also on household usages. We are proposing to extend this policy to households in all countries based on a global consensus. Tax can be imposed based on the consumption of electricity and consumptions of fuel for vehicles used for domestic purposes. Based on the number of members of a household government can allot threshold level of consumptions for both electricity and fuels. If emissions from a household exceeds the threshold level a progressive tax should be imposed. Due to penalization people will become more conscious and will try to cartel consumption of electricity. That will definitely lower the burn of fossil fuels and improve the quality of air.

#### **Incorporation of environmental activities in welfare schemes:**

The covid-19 has high degree of impact on labor market, worldwide there is sharp decline in working hours. The lockdown directly affects the informal economy, around 1.6 billion workers engage in this sector, their livelihood has at high risk (ILO, 2020). To prevent the most vulnerable unemployed, government can engage them in different environmental protection activities like rain harvesting, conservation and rejuvenation of river, tree plantation and gardening at welfare facilities. Such welfare activities would create win-win situation for laborers and the society, laborers will earn livelihood and society will get cleaner environment. In India, to mitigate the economic hardships of 3 million rural unemployed people government provided employment under the MGNREGA scheme in April 2020, involve in tree plantation, forestation, canal and pond preservation activities (The Hindu, 2020).

#### **Change in public transportation systems:**

Globally transportation is considered as one of the main sources of GHG emissions. On an average it contributes around 14 per

cent of annual emissions including non-CO<sub>2</sub> gases, in 2016 transportation was accountable for more than 24 per cent of CO<sub>2</sub> emissions. (World resources institute, 2019). During COVID-lockdown period the transportation sector has witnessed a sharp decline, which is one of the major reasons of recovery of quality of air. Now, it is anticipated that after the lockdown people will try to avoid public transportation to maintain social distancing, it may lead to the increase of usage of public transportation. These phenomena will definitely affect the air quality negatively. So, governments should come out with certain policies. Regulations should be imposed by the governments to restrict excessive usage of private vehicles. Restrictions on travelling per day, practicing of odd-even alternatives may be proved productive. Usage of non-polluting or less polluting vehicles like bicycles, e-cycles, cars with panels need to be aggressively promoted even after COVID-19 episode.

**Development and promotion of energy efficient electric appliances:** Governments should invest and also encourage private sectors in R&D to develop energy efficient appliances. This not only helps to reduce the emissions but also helps to reduce the energy bills of households. So, this policy can be clubbed together with Carbon tax policy on house hold energy consumption. In fact, after some period of times household can be penalized for not using energy efficient appliances. This tax can be used to subsidize and promote energy efficient tools and techniques.

**Subsidy on non-conventional energy:** According to International Energy Agency in 2012 worldwide fossil fuel (conventional energy) consumption subsidies was USD 544 billion. Almost all fossil fuel subsidies generate environmental externalities and caused market failure, if conventional

energy subsidies are eliminated by 2020, it will decrease CO<sub>2</sub> emission by 5.8 per cent (Espa and Rolland, 2015). Therefore, government must divert energy subsidies from conventional to non-conventional (renewable energy) energy sources to prevent the global commons from GHGs pollution. The installation of non-conventional energy sources like Rooftop PV system is very costly. Many nations started to support non-conventional energy sources, Indian government provide 50 to 70 per cent solar subsidies for the installation of Rooftop PV in their different cities (The Economic Times, 2019).

**Encouraging work from home:** During the lockdown most of the software companies allowed their employees to work from homes. Some, global giants have assured that they are going to continue this model even after the lockdown or considerably reduce the footprints in the office. The lockdown phase helped to understand that a considerable amount of work can actually be done from remote. Not only the software companies, but this model is getting practiced in other service sector also (like education, telemedicine etc.). Governments can adapt this model in service sectors and also encourage farms to do so. This may bring a huge improvement in environment as emissions from transportation, electricity consumptions, construction related activities will come down.

### **Conclusion**

In spite of lot of efforts and investments the existing carbon policies have failed to deliver up to the expectation. The cost of emissions on life and livelihood is havoc. The recent lockdowns to resist the spread of COVID-19 has left a positive impact on environment. Taking cue from the incidents during the lockdown we have proposed some policies and practices here. We have tried to logically analyze how these



policies/practices can bring change in the environment. The principal contribution of our paper is the introduction of a seminal carbon policy- “carbon lockdown”. Besides that, we have discussed that how some practices (like work from home, public transportation systems etc.) can be institutionalized to reap benefit.

This paper can be extended in numerous ways. All the policies/practices can be discussed with mathematical models. The pros and cons can be discussed with details analysis and figures. Someone can propose to strengthen the existing carbon policies (tax, cap-an-trade, strict cap) with hybridization of the new policies/practices. The rebound effects of these policies and other loopholes can also be discussed for exploring the scopes further.

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