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Is Declaring a Climate Emergency Enough to Stop Global Warming? Learning From the COVID-19 Pandemic

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One of the most important challenges our global civilization faces in the coming years is to achieve the Paris Agreement's goals of preventing the planet's temperature from exceeding the pre-industrial values of 2°C and limiting it, at most, to 1.5°C. Awareness of this problem has led to the creation of many national and international organizations in recent decades, with many thematic conferences being held and new policies to reduce greenhouse gas emissions—so far without attaining the necessary success. Among the political measures taken in recent years is the *climate emergency declaration* issued by many government institutions, highlighting the serious and urgent problem of climate change and the imperative need to find a solution. The COVID-19 pandemic, has led to reductions in CO2 emissions due to the substantial decreases in economic activity incurred by several countries imposing non-pharmaceutical interventions. Thus, the current practice of declaring a climate emergency must be fortified by making it a legal tool in order to reduce CO2 emissions and reach the objectives set by the Paris Agreement. Yet, what should this climate emergency declaration look like? In considering these current COVID-19-induced reductions in CO2 emissions, we hereby propose a political plan for stopping emissions to try to achieve the objectives of the Paris Agreement and at least some of the UN's 2030 Sustainable Development Goals. The article also proposes how to define the global climate alarm declaration to serve as an international legal tool for reducing CO2 and transitioning to a world free of these massive emissions. By analyzing the reduction of the emissions in different scenarios based on the COVID-19 pandemic, the article shows that the needed reduction of emissions proposed by the EU in 2030 cannot be reached in any of the scenarios limiting the CO2 emissions.

Keywords: climatic emergency, COVID-19 pandemic, CO2 reduction, climatic alarm, Paris Agreement

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INTRODUCTION

The agendas of governments, the media, and many social groups over recent decades have prioritized reducing greenhouse gases (GHG) in the troposphere in order to curb global warming and its catastrophic consequences for the planet's economy, society, and biodiversity. This has led to the creation of numerous international organizations such as the IPCC, as well as different levels of

government entities and international thematic meetings like the Conferences of the Parties (COP). The main objective is to reduce GHG emissions, mainly CO2, in an attempt to mitigate global warming. However, all these measures have ultimately proven to be insufficient and ineffective, as the global reduction in emissions has instead so far increased year after year (Jackson, 2019).

One of the latest international measures taken by governments and many institutions is to issue a *climate emergency declaration* which recognizes that an administration must act on the causes and impacts of climate change in order to mitigate and reduce its effects. However, what exactly is a climate emergency? What are the implications of declaring one? This paper attempts to answer these questions with a focus on CO2 as one of the major sources of GHG emissions.

THE CLIMATE EMERGENCY DECLARATION

An emergency is a situation of serious risk, catastrophe, or public calamity that requires coordinated intervention by public authorities and citizens in order to protect and relieve people and goods (https://www.oxfordlearnersdictionaries.com/). Therefore, by definition, declaring a climate emergency implies political recognition that climate change poses a serious risk of catastrophe for society, which must be addressed immediately through the coordinated efforts of the public body declaring the emergency and its citizenry in order to protect both people and goods (UN environmental program, https://www.unenvironment.org/explore-topics/climate-change/facts-about-climate-emergency).

Since 2019, many institutions around the world have issued *climate emergency declarations*. For example, the European Parliament approved a resolution declaring a European and global climate and environmental emergency in December 2019 (https://www.europarl.europa.eu/news/en/press-room/20191121IPR67110/the-european-parliament-declares-climate-emergency), which committed the European Commission to align all legislative and budgetary proposals with the objective of limiting global warming to less than 1.5°C, as set out in the Paris Agreement (https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement). The Parliament has called on the European Union to present a climate neutrality strategy as soon as possible and no later than 2050. Through a more broadly defined climate and energy framework, legislation adopted at the end of 2018 committed the EU to reducing GHG emissions from 1990 levels by at least 55% by 2030, (https://ec.europa.eu/climate/police/strategies/2030_en).

In addition, several national, regional and local governments have declared climate emergencies, although in most cases these were mere gestures of political will without enacting any measures or setting budgets for effectively and efficiently combatting CO2 emissions. Yet, the problem of climate change nevertheless remains serious and requires urgent action before we reach the inevitable point of no return (Asayama et al., 2019) in which the irreversible effects of climate change lead to catastrophic economic, social, and biodiversity consequences in the near short term, to say nothing at the moment of the long term (Watts, 2018).

The 2015 Paris Agreement established a global framework to stop climate change from becoming irreversible, namely by maintaining global warming at below 2°C relative to pre-industrial levels and by endeavoring to limit the increase to 1.5°C by 2030 in order to reduce the risks. If we are to initiate drastic and rapid reductions that will achieve the necessary balance between carbon emissions and sequestration over the second half of the 21st century (CO2 neutral planet), global emissions must reach their maximum level as soon as possible. The 2015 Paris decisions constitute the first universal and legally binding resolution on climate change, by which governments formally agreed to transition their current policies toward carbon neutrality by the end of the 21st century, a goal that relies fundamentally on the collaboration of cities, regions, local administrations, civil society, and the private sector.

In December 2018, COP24 agreed on the Katowice Climate Package, which established in detail the common rules, guidelines, and procedures necessary for fulfilling the Paris Agreement and tackling climate change (https://unfccc.int/process-and-meetings/the-paris-agreement/katowice-climate-package). It covers all the key areas for adhering to the agreement: transparency, financing (for those who need it), mitigation, adaptation, and flexibility. Furthermore, it calls for the implementation and reporting of commitments through procedures that are transparent, complete, comparable, and consistent.

Apart from agreements through intergovernmental negotiations, steps have been taken by countries, regions, cities, businesses, and civil society to accelerate cooperation and combat climate change within the framework of the Global Climate Action Agenda.

Recognition of a climate emergency therefore shows that governments are sensitive to the problem of climate change and that it is necessary to act quickly in an organized fashion through a strategy that is global and not sectorial or nominal. This has important policy implications for all governments, from local and regional councils to state ministries. However, if a government simply issues an emergency declaration pro forma and fails to act on it, that very government runs the danger of discrediting itself politically by neglecting to address a serious and urgent problem that it has recognized. This is true even if the administration acts timidly and with little coordination between itself and other organizations.

According to the IPCC report published in August 2021 (https://www.ipcc.ch/sr15/), global warming is accelerating and the effects of climate change come more rapidly and severely over the next 20 years. Furthermore, model projections indicate that the 2040 goal of not exceeding an increase of 1.5°C should be moved up to 2030. Yet, CO2 emissions have not been reduced by official climate emergency declarations and have instead continued to rise (Friedlingstein et al., 2019; Peters et al., 2020), showing once again that these declarations indicate mere intent but not any willingness to act. According to the latest IPCC published in February 2022 (https://www.ipcc.ch/

report/ar6/wg3/) emissions should peak before 2025 and then fall drastically in the following 30 years until almost disappearing in the second mid-century, to avert climate catastrophe.

According to this report, deep and, in most cases, immediate reductions in greenhouse gas emissions in all sectors are necessary.

Given the end results of these climate emergency declarations, several questions arise:

- Is the declaration of climate emergency a sufficient enough political and legal tool for combatting climate change and achieving the IPCC and Paris Agreement objectives?
- Can Europe reduce 55% of emissions by 2030 by declaring climate emergencies?
- Alternatively, should we form a new declaration with actual measures for controlling global warming?

On the other hand, in attempting to reduce the incidence of COVID-19, the months-long drastic worldwide reduction in economic activity from February to May of this year was more effective in reducing CO2 than any of the many measures adopted in recent decades. During this period of almost total economic shutdown in many countries, emissions have been reduced to values not seen since 2006 (Le Quéré et al., 2020). In addition, Goel et al. (2021) studied the change in air quality due to the pandemics lockdown in Punjab region. In light of these unintended experiments, one naturally wonders how a climate emergency declaration should be defined, how long it should last, is it enough to achieve the goal of a 55% of CO2 reduction by 2030, and what its consequences would be?

THE CLIMATE ALARM DECLARATION

The health crisis resulting from COVID-19 has proved that when a population faces a serious and urgent situation affecting its goods and services, many countries have at their disposal powerful instruments to reduce the incidence of the pandemic: total or partial restriction of mobility and the halting of economic activity, among others (Flaxman et al., 2020). These exceptional measures were taken in many cases by declaring a state of emergency or through other similar legal instruments. Before the COVID-19 pandemic, CO2 emissions were growing at approximately 1% per year over the previous decade (Friedlingstein et al., 2019; Peters et al., 2020). However, when the pandemic led to a halt being imposed on economic activity and transportation in the major CO2-emitting countries, these emissions decreased significantly.

Le Quéré et al. (2020) analyzed 69 countries, 50 US states, and 30 Chinese provinces, which all together represent 85% of the world's population and are responsible for 97% of the planet's total emissions. They estimate that, up to the beginning of April 2020, the average daily reduction in CO2 was 17% compared to the average 2019 levels (between −11 and −25%), with peaks of up to −26% in some countries. These authors additionally estimate that the overall reduction for 2020 will see a minimum variation of −4% (range of −2−−7%) and a maximum of −7% (range of −3−−13%), depending on how the economic recovery goes. Based on data for May 2020, they further estimate a global GHG reduction of 2.5 Gt, 0.6 Mt of PM2.5, and around 5.1 Mt of SO2 and NOx. All these environmental improvements occurred as a result of the profound socio-economic crisis, which will undoubtedly be a challenge to recover from while addressing unsustainable global patterns (Lenzen et al., 2020).

The European Union, thought the European Climate Law has set the goal of a 55% reduction in emissions by 2030 in order to limit the effects of climate change (https://ec.europa.eu/clima/eu-action/european-green-deal/european-climate-law_en). Regarding the tendency of emissions during the last years, is this target realistic without any policy action to limit CO2 emissions? Additionally, is this target realistic within a political framework limiting the CO2? How many days per year should be limited the emissions of CO2 to achieve the 55% of CO2 reduction by 2030?

Based on the reduction of the emissions calculated by Le Quéré et al. (2020) due to the 40-day nearly absolute shutdown of the economy, three reduction scenarios can be proposed here: low (4% per year), maximum (7% per year), and average (5.5%), which corresponds to a limitation of the common ratio built for computing the reduction per year in CO2. This information can be used to analyze the convenience of partial shutdowns in order to achieve the proposed 55% reductions of CO2.

Let's consider that during the first year there is a 3-days lockdown per month, equivalent to the 40-days per year scenario, limiting the CO2 emissions. Let's take into account a 1% of increasing percentage per year and the reduction percentage of r% per year for the successive values of $r \in \{4, 5.5, 7\}$.

To generate the reduction sequences, we use the following formula: $E_k = E_0 \cdot (1.01)(1 - \frac{k}{3} \cdot \frac{r}{100})$, $k \geq 0$ where k represents the number of shut down days. Next, the reduction percentage with respect the first value E_0 is computed.

Hence, in order to achieve the desired percentage reduction, a sequence of increasing closing days must be defined. Among different options and just as an example, each year from 2023 to 2030, it should be an increase of 1 day per month on 2024 (4.33), 3 days per month the following 2 years (7.33 and 10.33) and 4 days per month the rest of the years until 2030 if we start with the 3.33 days per month of lockdown. **Figure 1** shows the breakdown in days per year versus reduction percentages for each scenario from 2023 until 2030.

Given the minimum emission reduction scenario of 4% per year, the goal cannot be achieved no matter how many days per month of lockdown. The maximum 7% annual reduction scenario would meet roughly a 30% reduction working just 15 days per month and would have a 54.85% reduction in 7 years by closing 26,33 days per month accomplishing the proposed goal, which means absolutely nonsense. The average scenario of a 5.5% annual reduction in planetary CO2 emissions would just reach a 43% by the end of the seventh year.

It is essential to highlight that all these reductions are based on stopping most of the economic activity for several days a month at a planetary scale, increasing each year, particularly in the 69 countries, 50 US states and 30 Chinese provinces mentioned previously (Le Quéré et al., 2020), which empirically demonstrates that it produces a large decrease in CO2 emissions.

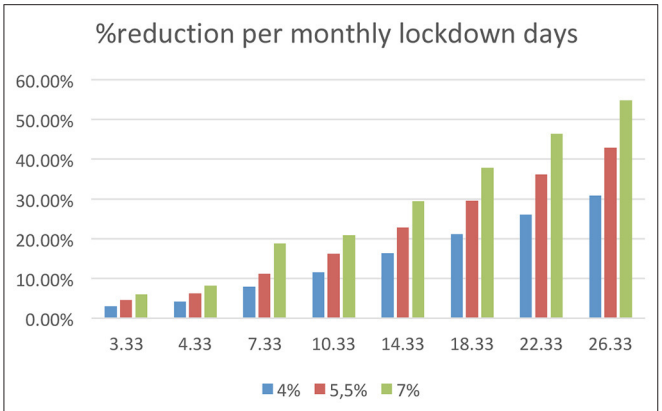

FIGURE 1 | Closing days proposal in order to achieve a given reduction in CO2 emissions, assuming a minimum reduction of 4% per year (blue), average of 5.5% (red), and maximum of 7% (green), based on estimates by Le Quéré et al. (2020).

An important difference exists between the halting of economic activity as a result of COVID-19 and the freeze that we propose. This monthly N-day hiatus does not necessarily imply ceasing all industrial activity or all mobility, nor does it mean confinement of the population, since it is not a response to any health crisis. It only involves interrupting all the activities associated with direct CO2 emissions, except for those considered essential. No stoppage should be imposed on industrial activities that use clean energy without directly emitting CO2, on those fueled by renewable energy, or on industries that apply alternative methodologies for achieving zero emissions. Those exceptions would be excluded primarily because they do not contribute to the urgent and serious challenge of drastically reducing CO2 emissions. This would additionally and most certainly encourage industries to rapidly accelerate their transition to clean energies without any need to declare a state of climate emergency.

What Should a Global Climate Alarm Look Like?

Looking at the measures for restricting movement and economic activity that some countries implemented by declaring a state of emergency to confront the COVID-19 pandemic, we find inspiration for defining a global state of climate alarm for at least 3 days a month in order to reduce emissions as described above.

This state of climatic alarm should comprise, at least, the following.

- It should be a global law legislated by a competent international body, such as the United Nations, and ratified by all governments.
- It should fundamentally affect countries that contribute the most to global emissions. In order to meet the abovementioned projections, this global climate emergency should crucially be implemented in the 69 countries that contribute 97% of the planet's total emissions (Le Quéré et al., 2020), while the remaining developing countries could initially be excluded. If only some and not all of the abovementioned 69 countries were to comply, the effect would be severely limited and unable to achieve the desired goal.
- The state of global climate emergency would necessarily require that most of the CO2 emissions are suppressed, with the exception of the essential sectors needed to cover people's basic needs. These would be determined within the context of this state of climate emergency. Air traffic based on internal combustion engines would be drastically reduced during these N days per month, as well as all non-electric surface transport. This does not mean confining people or limiting their movements during this declared period, unless said activities are associated with CO2 emissions. Any mobility based on renewable energies that do not emit CO2 would be allowed and even encouraged. Non-emitting industrial activities would be permitted and reinforced while those associated with the prohibited emissions would be discouraged during these N days per month each year until 2030.
- States should ensure that anthropogenic activities with CO2 emissions do not increase outside the state of emergency as compensation for the inactive period. The penalties for going beyond the reference threshold should be drastic and forceful, not economic—as some industries may calculate profitable strategies to counterbalance any sanctions.

CONCLUSIONS

Despite warnings from the scientific community in recent years about the importance of avoiding the irreversible effects of global warming by reducing GHG emissions and declaring a climate emergency, the concentration of CO2 in the atmosphere continues to increase. Nevertheless, a new legal and political framework has emerged, showing us how to intervene more efficiently and forcefully. Specifically, a large number of countries decided to reduce the incidence of COVID-19 by significantly reducing mobility and non-essential economic activity. During this period, CO2 emissions decreased significantly. Our proposal for declaring a global state of climate alarm is inspired by the reduction in emissions resulting from this decreased activity. Unlike other declarations of climate emergency to date, the explicit one proposed here should be imposed immediately and with the utmost urgency. It should be well defined by international jurists and can become a turning point in the fight against climate change. It would serve as the ultimate tool for combatting the imperative severity of climate change, just as it was used for the COVID-19 pandemic.

Based on estimates by Le Quéré et al. (2020), a 4–7% reduction in global CO2 emissions occurred as a result of the shutdown of activities in the six sectors analyzed by the authors over the approximately 40 days of containing the COVID-19 pandemic in some period between January and April 2020 (depending on the country). However, according to the calculations presented in Section 2, it won't be possible to achieve a 55% of reduction of CO2 emissions by only limiting a 3 days per month (40 days per year) the activities emitting CO2. To achieve a 55% reduction of emissions of CO2 by 2030, it's needed a more restrictive limitation in the activities emitting CO2 than 3 days per month.

It is needed to increase the number of days per month to achieve this goal. By reducing a 7% per year, it will be limit around 26 days per month the CO2 emissions, which it has not sense following the current economical model. If the number of days of CO2 limitation is reduced, the goal to get a 55% of reduction by 2030 cannot be reached. Analyzing these results, to reach the EU's goal of a 55% of reduction of CO2 by 2030 should be reformed. In addition, without any legal framework able to apply limitation on the days emitting CO2, this goal will not be done. The climatic alarm should provide a legal political frame for the implementation of this restriction.

Imposing the global climate emergency in the manner suggested here, renamed as climatic alarm, is not free of controversy. Above all, it implies several economic problems, such as:

- Financial compensation for companies and workers practicing these 3 days of inactivity.
- Governments experiencing an inevitable decline in their gross domestic product (GDP).

This article does not aim to propose solutions to these specific problems and the implication of the proposal it has been done here, as they correspond more to experts in economics and international politics. What we propose here is to address the immediate, serious, and urgent problem of reducing CO2 emissions in order to avoid the irreversible effects of global warming due to climate change, as they are proving to be disastrous on human societies, the economy, and biodiversity. Failing to act decisively could result in a 7% reduction in the world's GDP over the next decades (https://www.nber.org/papers/w26167). According to Nordhaus and William's (2007) well-known Stern Report, the costs and risks of climate change are equivalent to losing 5% of global GDP each year, in perpetuity. In contrast, the effects can be mitigated by an annual investment of 1% of global GDP, mainly in emission reduction policies. Declaring a state of climate emergency in the way that we describe appears to be precisely the most effective tool for meeting these goals.

If we are unable to stop most emissions before 2025 more than several days a month through this proposed state of climate emergency, it is not realistic to conceive of any other means for achieving the goals that have been set to stop global warming, the consequences of which will be more negative for economies and social inequality than if we were to stop all non-essential CO2-emitting activities for several days a month over some years.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

AUTHOR CONTRIBUTIONS

JM has proposed the idea, done the calculations, and has written the manuscript. MV has revised the calculations and reviewed the manuscript. DP has reviewed the calculations and reviewed the manuscript. All authors contributed to the article and approved the submitted version.

REFERENCES

Asayama, S., Bellamy, R., Geden, O., Pearce, W., Hulme, M. (2019). Why setting a climate deadline is dangerous. *Nat. Clim. Chang.* 9, 570–572. doi: 10.1038/s41558-019-0543-4

Flaxman, S., Mishra, S., Gandy, A., Unwin, H. J. T., Mellan, T. A., Coupland, H., et al. (2020). Estimating the effects of non-pharmaceutical interventions on COVID-19 in Europe. *Nature* 584, 257–261. doi: 10.1038/s41586-020-2405-7

Friedlingstein, P., Jones, M. W., O'Sullivan, M., Andrew, R. M., Hauck, J., Peters, G. P., et al. (2019). Global Carbon budget 2019. *Earth Syst. Sci. Data*. 11, 1783–1838. doi: 10.5194/essd-11-1783-2019

Goel, P., Kaur, H., Kumar, R., Bilga, P. S., and Aggarwal, N. (2021). "Analysis of Air Quality Index During Lockdown: A Case of Ludhiana District-Punjab," In: *Sustainable Development Through Engineering Innovations*, eds Singh, H., Singh Cheema, P. P., and Garg, P. Lecture Notes in Civil Engineering. (Singapore: Springer).

Jackson, R. B., et al. (2019). Persistent fossil fuel growth threatens the Paris Agreement and planetary health. *Environ. Res. Lett.* 14, 121001. doi: 10.1088/1748-9326/ab57b3

Le Quéré C., Jackson, R. B., Jones, M. W., et al. (2020). Temporary reduction in daily global CO_2 emissions during the COVID-19 forced confinement. *Nat. Clim. Chang.* 10, 647–653. doi: 10.1038/s41558-020-0797-x

Lenzen, M., Li, M., Malik, A., Pomponi, F., Sun, Y. Y., Wiedmann, T., et al. (2020). Global socio-economic losses and environmental gains from the Coronavirus pandemic. *PLoS ONE* 15, e0235654. doi: 10.1371/journal.pone.0235654

Nordhaus, R., and William, D. (2007). A review of the stern review on the economics of climate change. *J. Econ. Lit.* 45, 686–702. doi: 10.1257/jel.45.3.686

Peters, G. P., Andrew, R. M., Canadell, J. G., Friedlingstein, P., Jackson, R. B., Korsbakken, J. I., et al. (2020). Carbon dioxide emissions continue to grow amidst slowly emerging climate policies. *Nat. Clim. Chang.* 10, 3–6. doi: 10.1038/s41558-019-0659-6

Watts, J. (2018). We have 12 years to limit climate change catastrophe, warns UN. Available online at: https://www.theguardian.com/environment/2018/oct/08/global-warming-must-not-exceed-15c-warns-landmark-un-report (accessed May 20, 2021).

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