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## Assessment of a Decade of Greenhouse Gas Emissions

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### Abstract

*In this article, we aim to analyse the causes of the greenhouse gas emissions gap and their evolution, comparing the expected results established at the 2010 Hague Conference with what actually happened in the last 10 years. The paper will try to explain that even though some important steps were taken, the planet is not yet on a good path if we don't improve our industrial activity. The solutions already exists, few countries implemented them and we could see real results in different sectors of activity (mainly power generation), but obviously not simple to replicate everywhere. The public policies and the environment agencies in charge of implementing them must assume this responsibility and find appropriate methods so that the objectives assumed at COP 21 Paris can be achieved by 2030.*

**Keywords:** GHG emission, COP21 target, CO<sub>2</sub> reduction potential, power generation, environment public policy.

**JEL Classification:** A 12, H 73, Q2, Q4, R11

### 1. Introduction

Despite a decade in which most of politicians and society leaders have focused on climate change and settling the goals of the Paris Agreement, the value of global greenhouse gas (GHG) emissions has not diminished at all; actually, the difference in emissions is bigger than ever. It is obvious that if there are no immediate and ambitious measures from all decision makers that will materialize in long-term strategies, accepted by all important factors, the objective of having a temperature increase of only 1.5°C compared to the preindustrial period can no longer be reached and even achieving the temperature target well below 2°C is becoming increasingly difficult. Of course, some unexpected events, like Corona virus, can immediately and drastically reduce the global commercial activity with a direct

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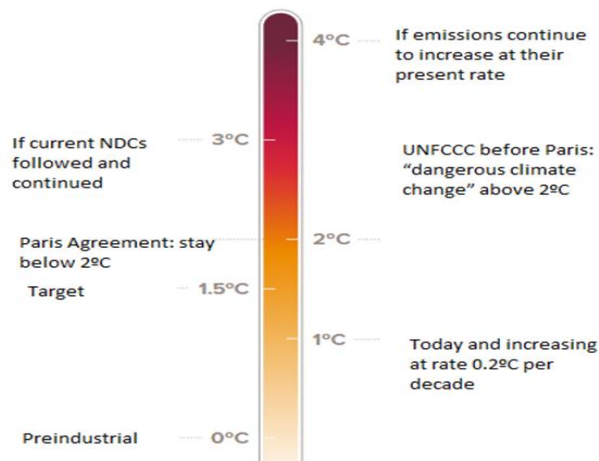
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positive impact on reducing CO<sub>2</sub> fingerprint. No doubt, in the most affected areas, there will many people working remotely from home which means at least car traffic diminishing. This situation cannot be predicted, but it proves that the world can continue its activity without excessive consumption.

Before looking at the global trend in greenhouse gases (GHG) over the last 10 years, for a better understanding, we present a small summary of the objectives adopted by the Paris Agreement in 2015 - COP 21.

Thus, for many years, countries that have met under the United Nations Framework Convention on Climate Change (UNFCCC) have considered 2°C as the level of warming over which climate change would be extremely dangerous. In this context, concerns have been raised about the impact of climate change – some of them are already apparent and other expected at 2°C, including the effect of sea level rise in island countries below sea level.

Due to human activity, the concentration of atmospheric carbon dioxide (CO<sub>2</sub>) has increased by more than 40% compared to preindustrial times. In addition of this, we faced the increase of level in other greenhouse gases, such as nitrogen oxide, and this situation has led to an average increase in global temperature of 1°C above preindustrial levels, with much higher heating in some regions, especially in Arctic area. Currently, global temperatures rise to around 0.2°C every ten years. This rise in temperature already has a visible impact, which is the rising of sea level and without any doubt this will continue in coming years. Global heating has brought its contribution to more frequent and intense extreme weather events, such as heat waves in Europe, unprecedented bush fires in Australia, heavy rainfall in dry area and even snowfall in Iraq. It is easy to predict that if this trend will continue, the impacts will become more and more severe, as long as general temperature increases.



**Figure 1. Level of expected global warming**

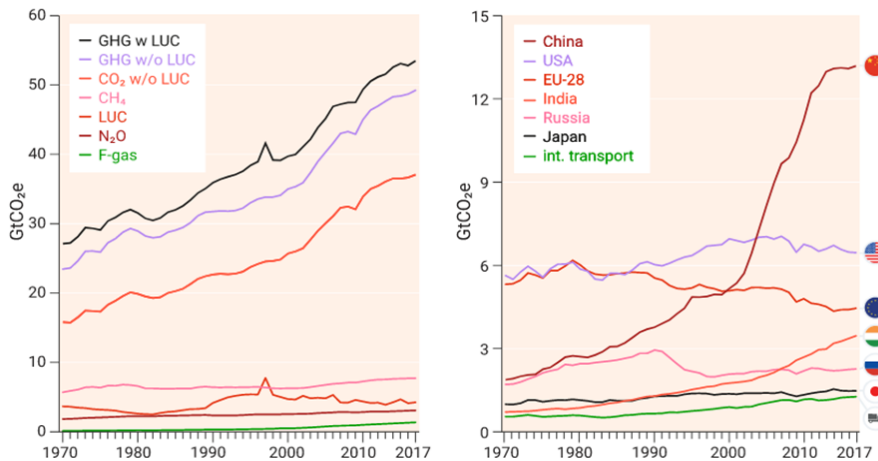
Source: <https://royalsociety.org/-/media/policy/Publications/2018/keeping-global-warming-to-1-5-C--challenges-opportunities.pdf>

Under the actual circumstances (business carried out as usual), the pledge to reduce emission, voluntarily agreed by almost all countries under the Paris Agreement – named *nationally determined contributions* – NDC, with a high probability, we will have a global warming of around 3°C by 2100. But this is only if we observe the understanding we reach up until now. On the other hand, if GHG emissions continue to increase at their present rate (which means that not all countries observe their resolutions), temperatures could go above 4°C by the end of the century.

Aiming the 1.5°C objective may still be real but the politicians, lobbying societies, industry leaders and international corporations, public society have to go on the same direction in order to succeed. It is very important that the next period to have and follow a real project management, with a clear plan observed by all countries and international organisations, by each business sector and by all concerned players. As we will see in the next parts, there is a big difference between what was pledged by all countries and the reality.

Let's see what was achieved during the last decade, despite the official agreement conclusion and the happy faces after each COP or other international environment meeting.

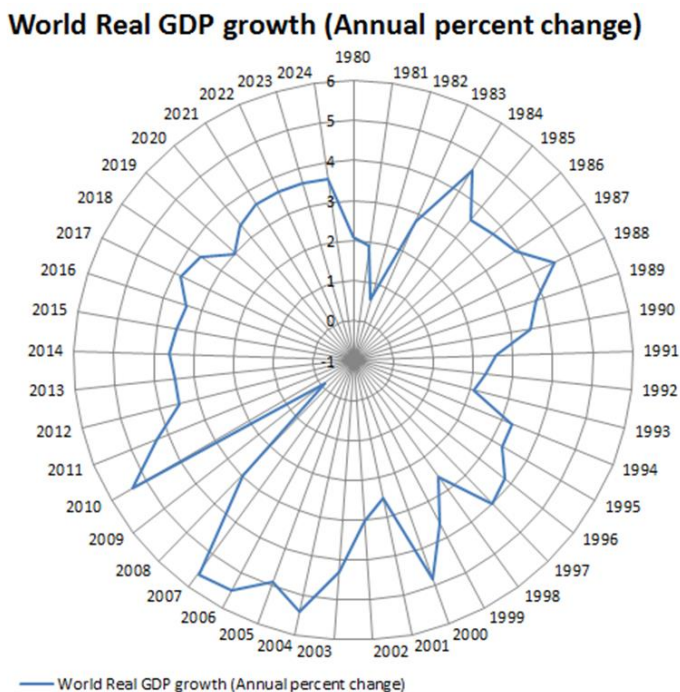
There are still some countries who are registering a certain progress in terms of GHG emissions (mainly grouped under the EU) but they cannot offset the general situation. Overall, the global level of GHG emissions continues to grow in a steady pace. According to UNEP, between 2008 and 2017, the GHG global emissions grew with a rate of 1.6% yearly, reaching 53.5 Gt of CO<sub>2</sub> in 2017. According to preliminary data, 2018 will set a new record. If we look closer to the data, we can see that EU is the single entity which succeeds in diminishing voluntarily its emissions while Russia, Japan and USA are maintaining the same level. China and India are by far the most harmful in the general picture.



**Figure 2. Global greenhouse gas emissions per type of gas and top greenhouse gas emitters**

Source: UNEP (2018)

Unfortunately, the current level of GHG is at exactly the same level as forecasted for 2020 as if there were no policy or global willing to emissions gas reduction which means that there was no real change in the global emissions over the last decade. Despite some improvements, it was insufficient to offset the global economic growth (as we can see from data published by international experts (I.M.F., 2019) in the graphic below, the global GDP moved from 66.07 thousand billion USD in 2010 to 86.6 in 2019<sup>i</sup>) and population growth (according to United Nation data – published in the Revision of World Population Prospects, 2019 – from 6.9 billion to 7.7 in 2019; the same data could be also found in other sources<sup>ii</sup>). Unfortunately, it is proved once again that GHG emissions are strongly linked to economic activities and also with the growing number in population.



**Figure 3. World GDP growth, own representation based on IMF data**

Source: [https://www.imf.org/external/datamapper/NGDP\\_RPCH@WEO/WEO\\_WORLD](https://www.imf.org/external/datamapper/NGDP_RPCH@WEO/WEO_WORLD)

We like it or not, we globally failed to reach the objective of reducing GHG emissions for the last decade, therefore we will have to suffer the consequences.

It is obviously that the data show that all countries have to raise their ambitions expressed by the actual NDCs, in order to get in line with the objective of limiting the warming below 2°C, useless to say that reaching the 1.5°C is almost a utopia at this time. Still, theoretically there is yet a chance, if everybody would have agreed to accept new and more ambitious NDCs that should have been applied immediately and in an accelerated manner. The researcher of Emissions Gap Report reached to the conclusion that continuation of current policies would go to a

rise of temperature of 3.7°C by 2100. Implementing the current NDCs would only make the temperature to reach 2.9°C by 2100 which is obviously not enough compared to the initial ambitions.

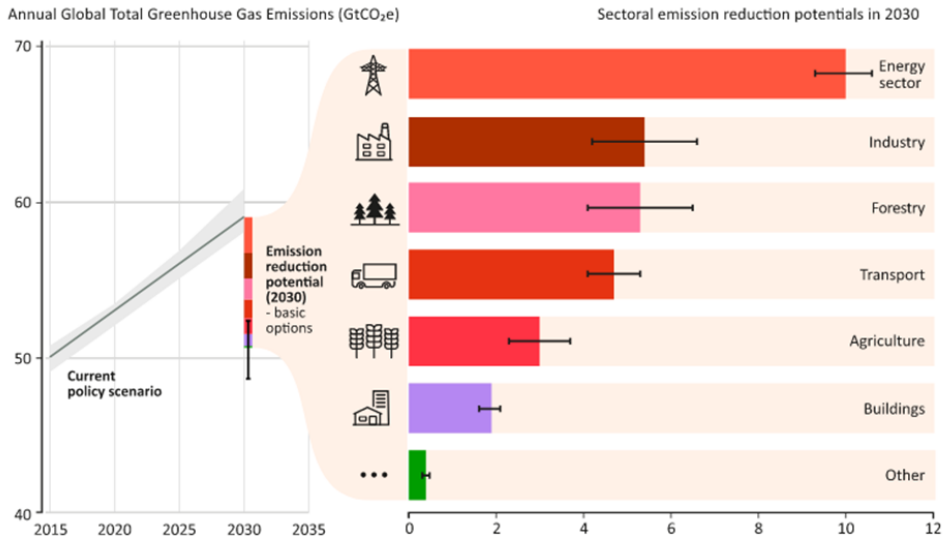
There are few strategic options to enhance NDCs, which we classified in four main groups:

GHG target	Sectorial non-GHG target	Policies and actions	Alignment of implementation of existing NDC objectives with long term ambitions
Increase in the level of urgency of existing GHG target	Increase in the level of urgency of sectorial non GHG target	Reinforcement of the actual policies and actions and control	Pledge to achieve the existing NDC through policies and actions that are in line with the long term solutions of decarbonisation
More communication about the benefits of the actual GHG target	Advancement of a sectorial non GHG target	Addition of new innovative policies based on the new evolution	
Reduction in the span to reach the existing target	Assuming and communicating the need to overcome the sectorial non GHG target		
Assuming and communicating the need to overcome the actual GHG target	Adoption of a new sectorial non GHG target		
Adoption of a new GHG target			

Some researchers (UNEP, 2019), in the Emission Gap Report drawn in 2017<sup>iii</sup> revealed a clear assessment of CO<sub>2</sub> reduction options for different sectors. The conclusion is that if there is a common willing we might have a real possibility to reach the 1.5°C target by 2030, if the countries and all concerned entities agree to adopt cost effective technologies and best practices. It is only needed to extend and multiply the existing clean technologies. The results will also bring an important contribution to all SDG indicators.

The results of the report are based only on proven and existing technologies and show that the emission could be reduced by 33 Giga tones CO<sub>2</sub> / year till 2030 (we

considered the average between 30 and 36 Gt CO<sub>2</sub>) which is largely sufficient to reach the 2°C objective or even a lower objective.



**Figure 4. Emission reduction potential**

Source: <https://wedocs.unep.org/bitstream/handle/20.500.11822/30022/EGR10.pdf?sequence=1&isAllowed=y>

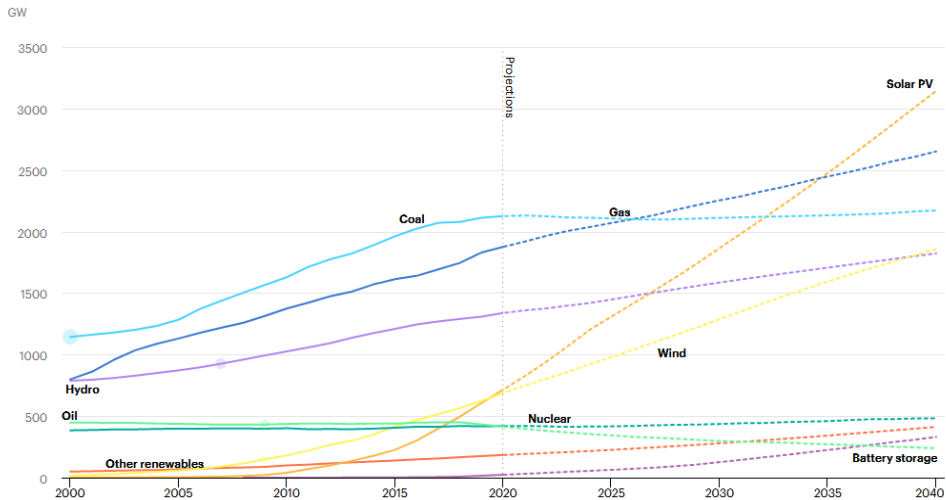
We could also see that there is a big potential in certain area like solar and wind energy, efficient appliances, intelligent passenger car transport systems, stopping deforestation and initiating reforestation, efficient buildings and productive agriculture. Only these areas have together a potential of reducing up to 21 Gt CO<sub>2</sub> / year that would be enough to push the global temperature down to the 2°C objective. Not to mention that it is highly probable that till 2030 other areas or new technologies to bring their contributions to emission reduction, which means that today we have the possibility to reach the threshold of 1.5°C.

Nevertheless, we have to admit that these calculations are true only if all countries will start immediately to implement the most effective measures which are a theoretical assumption, considering that there are different economic policies in line with the local context. Still, it was proven that if wanted, we have all conditions to take action.

CO<sub>2</sub> emissions coming from fossil fuel consumption in the energy, transport and industrial sectors are representing the main part of GHG emissions. The researchers from the International Environment Agency (IEA, 2019), whose results are published in World Energy Outlook, found that the energy demand will raise by 1.3% each year to 2040, with increasing demand for energy services which make an obligation for the industry to improve its efficiency<sup>iv</sup>. In other words, we may conclude that the energy needs will increase by around 30% until 2040. This growing demand is nourished by the growing of population, the overall economic

growth mainly in the sectors of urbanization, transport, industrialization, infrastructure and growth of a world middle class. It is clear that the need to change the production lines of energy is immense but also the way we consume it, if we really want to achieve the Paris Agreement objective.

Fortunately, we can see quite a dramatic change in this sector in the forthcoming years. The technological advance is shared among all countries due to foreign investment; therefore the following graphic is very representative for energy future sources.



**Figure 5. Power generation capacity by source - 2000-2040**  
 Source: <https://www.iea.org/reports/world-energy-outlook-2019>

It is predicted that up until 2040 low-carbon energy sources to provide more than 50% of the total electricity production, while hydropower and nuclear will continue to have an important share - 15 and 8% from total.

Globally, the number of power plants using coal continues to grow, as do the emissions of coal. If we add the existing capacity to what is currently planned and under construction (assuming lifespans and standard utilization rates), we can see that it represents a significant part of the carbon budget available for a target of 2°C and would probably make the objective of 1.5°C impossible to ever reach. It is crucial to create a system that will allow the transition from coal to electricity if we want to have a real chance in achieving the target. We should start by cancelling new coal-fired power plant opening and continue with new energy alternatives solutions. For sure, the task is not easy since we have to take into consideration the affected workers, communities as well as industry owners but also the real new energy alternatives possibilities existing on the ground.

If we really want to move forward from the coal power production, we have first to stop the opening of the new facilities and then to find the best option to get out from the coal industry. There are only 10-11 countries in the world that are

producing significant coal emission and therefore finding the best solutions for a transition phase is very important in order to get them on board. We have to agree that because of the new energy equation, we will see affected workers communities, owners and other parallel industries that will suffer – therefore we have to be prepared to compensate their loss.

The Emission Gap Report of UNEP from 2018 shows that there are a massive increasing number of organisations willing to participate in climate action: “more than 7,000 cities in 133 countries and 245 regions in 42 countries, as well as more than 6,000 companies with at least \$ 36 trillion in revenues” had pledged for mitigation actions.

Many players engage in “international non-state cooperation and subnational players are essential, but the actual mitigation effects are still limited and poorly documented initiatives”. Obviously, it is an impressive number, but there is a huge potential for improvement. According to the available information, around 20% of the world population is taking part in the national or international environment actions; therefore, we can consider there is huge space for improvements all over the world. Still in the next years we have to look more into details about these aspects, since there are not sufficient data yet.

## **2. Conclusion**

It is clear that, in order to reduce GHG emissions, the only solution is combining innovation with existing technologies together with a transformation of people behaviour. In any case, this will not happen naturally, therefore we should take into consideration few important steps in order to succeed:

1. The only organisation that can assume the leading role is the public and not the private organisation, therefore they should be ready to take the risks.
2. Public organisations have to share honest feedback with all other interested organisations in order to let private investments to undertake initiatives in different projects.
3. We should have a unique green policy, known and accepted by everyone – in any case, we should not have different sectors fighting each other in order to have the best positions.
4. The innovation area should be encouraged to search more into GHG reduction emissions and consequently to produce more results that could be shared with the players.

Almost everybody (except few climate sceptics) is accepting that we have a real problem regarding the global warming due to GHG emissions – if we are honest, it is visible. If we take into consideration that this was known and predicted long time ago, seeing the actual situation, we have to admit that the past decade has been a missed opportunity in terms of reducing the global emissions. We have to say that a large number of positive political and technological developments have happened, which founded a solid base foundation for future actions. Obviously, there is still much more work to do in order to find the best solutions in term of



cost, efficiency, long term investment, stakeholders affected – the ultimate objective being zero CO<sub>2</sub> emissions. The next 10 years will be crucial with no coming back options or shy measures if we really want to attain the Paris Agreement objective.

## **References**

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- [1] IEA (2019). World Energy Outlook 2019, IEA, Paris <https://www.iea.org/reports/world-energy-outlook-2019>.
- [2] International Monetary Fund. World Economic Outlook (2019). Available at [https://www.imf.org/external/datamapper/NGDP\\_RPCH@WEO/WEO\\_WORLD](https://www.imf.org/external/datamapper/NGDP_RPCH@WEO/WEO_WORLD).
- [3] UNEP. The Emissions Gap Report (2017). Nairobi: United Nations Environment Programme (UNEP). Available at: [unenvironment.org/emissionsgap](http://unenvironment.org/emissionsgap).
- [4] World Population Prospects: The 2019 Revision. Available at <https://population.un.org/wpp/>.

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<sup>i</sup> [https://www.imf.org/external/datamapper/NGDP\\_RPCH@WEO/WEO\\_WORLD](https://www.imf.org/external/datamapper/NGDP_RPCH@WEO/WEO_WORLD).

<sup>ii</sup> <https://www.worldometers.info/world-population/world-population-by-year/>.

<sup>iii</sup> <https://www.unenvironment.org/resources/emissions-gap-report-2017>.

<sup>iv</sup> <https://www.iea.org/reports/world-energy-outlook-2019>.